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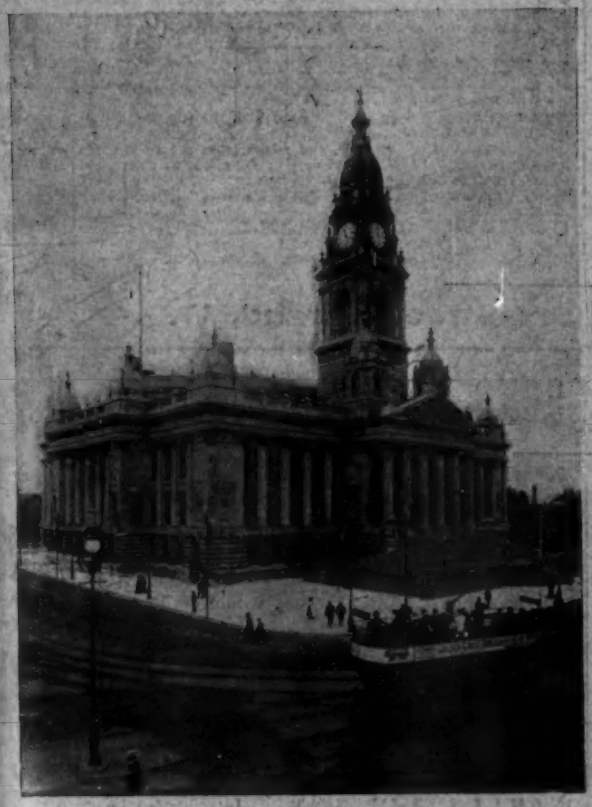

TOWN HALL, PORTSMOUTH.
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A MONTHLY MAGAZINE AND REVIEW FOR THE SCHOOL-ROOM AND THE STUDY

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EDUCATION IN PARLIAMENT—FEBRUARY, MARCH.

THERE has been no such exciting session as this for eighteen years, the old Parliamentary hands declare, but so far it has had little to say to education. Yet education and excitement are by no means incompatible, as the House of Commons has seen again and again when the "religious question" has come up. But even the "religious question" must pale its ineffectual fires before the lurid earnestness of Fiscal Reform, the position of Free Fooders, the senior member for Birmingham, what the Prime Minister did or did not do in connection with the retirement of Lord George Hamilton, Lord Hugh Cecil speaking and voting against the Government, the remarkable views which may be taken of Chinese imports into the Transvaal, and so forth—*toute la lyre*. These and other matters of burning moment had their turn and say in the debates on the Address to the King; but education, who was promised her brief strut upon the stage during the same period, was disappointed in the end.

Mr. Lloyd-George was to raise the question of the fight between clergy and county councillors in Wales as an amendment to the Address, but he omitted to do so. Not because he does not feel strongly on the point, nor because very pretty sword-play could not be made with the subject. No, but because the Irish members would all have voted with the Government against any motion in favour of de-denominationalising the non-provided schools.

All the same, Education had her brief passages during the six days of Fiscal Reform debate. Certain Free Traders, greatly daring, spoke of better education as a means to better trade. The Tariff Reformers groaned. Then somebody said that this country wanted a Charlottenburg. The Tariff Reformers groaned louder. Evidently for the time being education as a panacea has had her Parliamentary day. Preferential treatment of the Colonies is more popular with M.P.'s than education just now. That is not because they are Protectionists, but because they remember with a recurrent agony the long Education Bill debates in 1902, and the hashing up of the same question last year.

Still, the schools are to get their turn, even this session. Mr. Graham Murray, Secretary for Scotland, thinks well of his Scottish Education Bill. He was to have brought it in on Tuesday, the 8th of March, but was balked. Reports are current that it adopts the county district as the area of local administration, and sets up a directly elected body to manage education in that area. In more than one way the teachers stand to gain by the Bill.

Something has already been obtained for the teachers in naval schools. The estimates of the Admiralty for 1904–5 provide for that. Three of them are to become chief schoolmasters—a new rating, with improved pay; eleven of the naval schoolmasters (assistant teachers) are to become head schoolmasters and reach warrant officers' rank, with better pay, and £25 each to buy the uniform. Then there are other gratuities and extras. "Stick close to your desks and never go to sea," is what the National Union of Teachers has been advising schoolmasters for some time past. This has had its effect on the supply of teachers for the navy. The Admiralty, in fact, was compelled to improve the conditions of teaching in the fleet.

The medical men who are members of the House of Commons have been putting their heads together to produce a Re-vaccination Bill. Sir John Batty Tuke appears to have led them. The Bill calls upon teachers to supply the vaccination authorities with lists of

Next Month:

THE PORTSMOUTH CONFERENCE.

Illustrated.

children over twelve years of age. There would be a very pretty struggle in the House if this Bill went forward, which it is not likely to do this session, however.

The three heads of the Board of Education were seen laying themselves together at Westminster the other night. Something was being discussed in the House of Lords. The Marquis of Londonderry, Lord-President of the Board of Education, was sitting somnolently on the red Government bench. Suddenly the tall form of Mr. Morant was seen on the steps of the Throne. By some kind of telepathy the Marquis discovered that he was there, and joined him. Then they separated a while, Mr. Morant to disappear, but shortly to return with Sir William Anson in tow. The three of them went off together, earnestly talking. This is believed to forebode some dreadfully drastic measures for the county councils in Wales.

Up to the present moment of writing, Parliament has shown an Olympian unconsciousness that the County and Borough and Urban District Councils in Wales are defying its behests; but the matter will come on when the Education Estimates are taken (on which something will be written in our next). The Welsh members of Parliament, with but few exceptions, seem to rejoice in this flagrant Celtic breaking of the law, and the House of Commons is rather likely to have to make the law fit the Welsh ideas. If, as Burke said, one cannot draw an indictment against a whole people, the Board of Education is little likely to *mandamus* and imprison every mayor and council chairman in Wales.

Nevertheless, there is no disposition to make light of the Welsh proceedings, any more than of the Passive Resistance, which has lit a candle in nearly every part of England. The Home Secretary is not going to deal tenderly with the Passive Resisters. Mr. Channing asked him if he was aware that some Passive Resisters, summoned for the non-payment of school rates, had been put in the dock on their hearing. Mr. Akers-Douglas said (in effect) that he wasn't, and he'd be blest if he'd interfere!

Some of the humorous features of the Education Act's effect in operation have been brought before Parliament by question and answer. A vicar quarrelled with the local Education Committee as to who should be caretaker in the (non-provided) school. The vicar thereupon closed the school for two days on his own authority. Mr. Yoxall brought the affair to the knowledge of the House, and the Board of Education brought the vicar to book.

Then Dr. Macnamara put a useful question about an advertisement for a teacher, to perform extraneous tasks as well as to teach, which he said was about the worst case within his experience. Mr. Ashton exposed the woes of council managers of non-provided schools in one respect. The six—the four foundation and the two council—managers are called on to raise money to amend or enlarge the fabric of the school. *Query*, Are the two council managers liable personally for one-third of the money? If so, who are going to be so foolish as to accept nomination as council managers of non-provided schools?

Sir William Anson put forth one of those answers which turn away wrath. No, they are not so liable, he said, unless they chose to make themselves liable by becoming a party to the contract with the builder who is to make the repairs.

Two interesting questions were put, one by Mr. O'Donnell, once a teacher himself, about the position of teachers in Irish national schools. It seems that £35,000 is the amount of recent increase in the stipends of Irish teachers, and the number of them who have retired upon a pension since March 1900 is 740, which is at the rate of 185 retirements on pension per year.

As the perspicacious reader will have discovered before reaching this last paragraph, education in Parliament this year, so far, has come woefully short of its magnificent appearances on the stage at St. Stephen's in 1902 and 1903. But patience, patience — a time will come.

BY MANY HANDS.

"Quot homines, tot sententiæ."

Mosso on Fatigue.

SOME time ago we had occasion to mention the impetus which has been given to experimental psychology, and we enumerated the uncanny-looking names of instruments which have been invented for measuring nervous and muscular reactions, such as the myograph, ergograph, etc. The best popular explanation of these researches with which we are acquainted has just come to hand in the volume on "Fatigue," by Professor Mosso, translated into English and published by Swan Sonnenschein and Co. We strongly recommend all teachers who take a scientific interest in their own profession to get a copy of the book and study it. Every teacher is aware of the improvements that have accrued from the use of a varied time-table, and from shortening the length of individual lessons. In Professor Mosso's researches he will find scientific demonstration of his own empirical knowledge, and hints for further action. He will walk with the eyes of enlightenment along the path he has hitherto followed from blind instinct or experimental curiosity.

A Book to Read.

THESE studies in "Fatigue" will give the death-blow to many common notions on the alternation of violent mental and muscular exercise, such as, for instance, has been the accepted practice in English public schools for the last half-century. The theory that the best way to recoup from the exhaustion of strong mental effort is to indulge in strong muscular exertion turns out to be a fallacy of the worst type. Now that attention is being called to the degeneration of the national physique, and the necessity for elaborate physical instruction as a counteractive, it is more than ever necessary that teachers should have some scientific basis for the prac-

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tices they will follow; for it is to teachers, in the long run, that the country will look to carry out the necessary steps for the national regeneration. In that case Professor Mosso's book, though by no means the last word on the subject, will be invaluable in directing attention to the physiological facts underlying the question. On attention, methods of teaching and of intellectual work, the "anxious inquirer" may also find many hints. And to all such anxious inquirers, who ought to be many, we say, "Get Mosso."

* * *

Red—

RED is said to be an irritant colour to the bovine race. Its sphere of irritancy has been extended to loyal imperial-thinking Germans, and the daily papers have made merry over the fact. A Saxon schoolmaster who wore a red tie during the Sedan festivities in his school thought himself libelled by the remarks of the editor of the local paper, brought an action, and was condemned to pay all the costs! What a pother over a red tie! The offending neck adornment was considered as the outward and visible sign of the inward beast—to wit, of a Social Democrat, who is to your out-and-out imperial Teuton *anathema maranatha*—and the unfortunate Saxon dominie was heavily mulcted therefor. This supposed connection between Socialism—or, rather revolution—and red is curious, all the more so that the notion is so widespread. Aren't republicans by common consent dubbed "red"? And wasn't the *red* nightcap (though they called it a Phrygian cap) the symbol of liberty to the men of 1789?

* * *

—and Socialism.

THE connection is fixed, you see. But what is one to think, then, of the opinions of the directors of the London and South-Western Railway Company, whose servants sport, with one accord, the article abhorred of the court in Saxony? We have never heard one whisper of their sanguinary republicanism; yet perhaps it lurks there, for do they not hang out its flag? Mr. H. G. Wells has hinted at this same occult symbolism in his novel *Love and Mr. Lewisham*, where he makes his hero, teacher and student at the Royal School of Science, turn Socialist. Sundry gruesome contrasts of London life, sundry bitter personal comparisons, and the reading of *Progress and Poverty*, converted Mr. Lewisham, at a flash, to Socialism. How did he proclaim the fact? He went straight out and bought—a Red Tie! But he did not ask for a *red* one. He asked, in the flush of his newly-acquired ardour, for "blood-colour." And perhaps there he unwittingly revealed the inwardness of the symbol ascribed to Socialists by those of the opposite camp.

* * *

An Epigram for To-day.

WE have seldom come across a summary of any situation more pat than that which occurs in the first volume of Mr. Herbert Paul's *History of Modern England*. He is speaking of the grant of £100,000 for education asked for by Lord John Russell, and the objections urged against it by Roebuck, John Bright, and other Radicals who thought that "education was not the business of the State." Says Mr. Paul: "The State which does not make education its business will forfeit its business to States which do." Delightfully put, and summing up in its brevity the gist of all the agitations and speeches, commissions and reports, of the last few years. It is a sentence for teachers to remember. All the results of investigation into German methods, all the concentrated wisdom of the Mosely reports, can be crammed into this one curt sentence from the most recent of historians. And though written respecting a specific political act of half a century ago, it comes pat as the summary of the position of the present hour. And since we are in the mood for recommending books to our readers, we add a recommendation of this history of our own times, which is full of good things.

* * *

Free Trade.

THE upholders of Free Trade tell us that if the supply of a commodity runs short in one country, it can be made good by importation from other countries. There are, however, certain limitations to this rule, and the supply of teachers is a case in which it does not apply. Even if it were possible for the supply of teachers from one country to meet the demands of another, an inquiry into the condition of the educational market seems to reveal a shortage everywhere. The difficulty is particularly acute in France, where the closing of the clerical schools is greatly increasing the demand for trained lay teachers. The training colleges in France, up to the present, have been able to do but little towards meeting the supply. Returns are to hand from seventy-five departments, and in the best fourteen the number of trained teachers varies from 14·6 per cent. of the total number employed, in Côtes du Nord, to 10 per cent. in Indre et Loire. In sixty-one departments less than 10 per cent. of the teachers are trained, although in Vienne it reaches 9·9. In the department of the Seine, which contains the capital, the number is lowest, being only 3·1 per cent. The untrained teachers are generally better qualified than our Article 68's, but the great demand makes it necessary to accept young men and women with poor qualifications.

The Minister of Public Instruction calculates that the closing of the clerical schools will make it necessary to find 1,519 masters and 5,963 mistresses. It seems as though the supply of teachers diminishes as the demand increases. As M. André Balz writes in the *Manuel Général*: "Il me semble que la gent enseignante diminue en proportion directe de l'accroissement de la gent enseignable. Plus d'élèves dans les écoles, moins d'instituteurs pour les instruire."

* * *

THE touching little epistle which follows has been sent us by one of the District Inspectors of Education in the Transvaal Colony. It was concocted with all the precautions with which in our younger days we used to surround the preparation of a "round robin" for a half-day's holiday, and sent to the inspector with the signatures of all the scholars attached. The English must have cost some struggles to the youthful composers.

N——, 274,
September 10, 1903.

"Mr. ——, Education Department.

"DEAR SIR,—We children of this school do humbly beg thee to let us keep our schoolmaster, Mr. ——, as we do love him, and like to be educated by him. For we have notice that others do want to have him away from us. Should we be kept without school and our dear teacher who has brought us for the standard in which we are now? Do, please, grant us our wish, and we will always thank thee in our way of life.—With the most respect, Sir, your tender lambs," etc.

N.U.T. NOTES.

WHEN Mr. T. A. Organ relinquished his active connection with the Legal and Tenure Department of the Union, it was generally felt that his loss was well-nigh irreparable. For the best part of a dozen years he had been engaged in responsible, difficult, and delicate work, and his profound knowledge of school law, his ripe judgment, and sound common sense were ever at the disposal of the Executive. When the time came for him to undertake new duties, the officers of the Union were commissioned to make recommendations as to the choice of his successor, and they unanimously decided that no more suitable gentleman could be secured than Mr. A. A. Thomas, B.A., who, since the Cambridge Conference of 1899, had been the Secretary of the Examinations Board. The Executive cordially concurred, and for the past two years Mr. Thomas has more than justified the high anticipations which were formed of his ability and capacity to carry on Mr. Organ's work. Recently he was called to the bar; and the members of the Executive and chief officials at Russell Square, ever ready to recognise an epoch in the life of a colleague and to give their felicitations, decided to present to Mr. Thomas a wig and gown and the rest of the paraphernalia of a barrister's outfit. The President and Treasurer of the Union, the Chairman and Vice-Chairman of the Tenure Committee, the Chairman and Vice-Chairman of the Law Committee, and Miss Hannah Williams (as a delighted "fellow-countryman") had each the good fortune to "say a few words" on the happy occasion. Mr. Thomas's response was modest and characteristic. The Union's latest Standing Counsel appeared at Conference for the first time in 1892—the year of the great renaissance—and since that date I have known him intimately. He was one of my most strenuous supporters during the storm and stress which preceded the launching of the N.F.A.T., and for a long time was a trusted and popular officer of that active organisation. We were elected together on the Executive at Manchester in 1895, and as the years rolled on his position became one of ever-increasing strength. Those who know him are more than confident that he will make his mark in a profession wherein there is constantly "plenty of room at the top."

Mr. A. A. Thomas, B.A., Barrister-at-Law.

THE "premier" association is an epithet frequently used with reference to that of Finsbury and City, and well has it earned the distinction. Not only has it been the strongest numerically of all the four hundred and fifty local branches of the Union for very many years, but it has furnished the N.U.T. with a list of workers whose names are as household words to the *au courant* Unionist. Mr. Hamilton, the genial Treasurer of the Union, is a Finsbury man; Mr. Sykes, one of the most courtly and dignified presidents the N.U.T. has ever possessed, hails from the same association; Messrs. Organ, Thomas, Shadrach Hicks, and Cullum have, each in turn, added lustre to Finsbury's name as members of the Executive and most efficient officials; Mr. F. W. Hearn, as Treasurer of the "B. and O." Fund, and Messrs. Hamblett and Tutt as members of its Central Council, keep Finsbury's name and memory green in the most noble work the Union undertakes; Mr. Golding, the Secretary of the Teachers' Provident Society, and Mr. W. H. Hartwell, a member of its Board of Management, are Finsbury men likewise. This lengthy array have all deserved the gratitude of their fellow-teachers. Yet possibly not one of them will live so long in the recollection of the perplexed and distressed as Mr. T. H. Jones, the late Chairman of the Tenure Committee, who has visited practically every county of England and Wales in defence of the rights and liberties of those seeking the Union's aid and advice. To my infinite regret, the orders of a peremptory medical gentleman prevented my attendance at a complimentary dinner given to Mr. and Mrs. Jones, on the 19th ult., at Frascati's Restaurant. About a hundred ladies and gentlemen were present to testify their esteem and affection, respect and admiration, for the guests of the evening, and amongst these were most of the members of the Executive. One who was there tells me that on rising to respond to the toast of his health Mr. Jones was accorded an ovation which lasted for some minutes. In a speech tinged with emotion and deep feeling he referred to some of the trials and anxieties of his new occupation as Inspector of Schools. Despite these, however, he was happy and comfortable in his new sphere of labour, and, I make bold to interpolate, the teachers in his district will be happy and comfortable also. His one source of regret was his separation from Association and Executive work. One of *my* regrets is that he did not remain with us a few months longer, for he would undoubtedly have won the "Blue Riband of the Union."

The "T. H. Jones Dinner."

THE cold hand of Death seems to have been laid to an inordinate extent on prominent Union workers during the past two or three years. Ten days after he had been with them, apparently in excellent health, the members of the Central Council of the "B. and O." Fund were shocked and grieved beyond description to learn that Mr. James Hodge, a former Chairman of the Council, had passed away. The present Chairman, Mr. C. J. Chase, in the course of a brief and eloquent tribute, stated that Mr. Hodge "had done as much, if not more, for the Fund than any other man he knew. He had given his money, his time, and his energy to the cause he loved." This is true. No member of the Council had a higher and deeper sense of his personal responsibilities than Mr. Hodge, and he expressed his views with a degree of courage, earnestness, and sincerity which ever assured for him an attentive and sympathetic hearing. He cared nothing about being in a minority of one, so long as his conscience and judgment told him he was right. It will be difficult to fill his place at all adequately, for, as Mr. T. G. West, the Vice-Chairman, said, "men of the calibre of Mr. James Hodge were by no means numerous." Those whom he has benefited, and those privileged to labour with him for a great cause, will join alike in sympathising with the dear ones he has left behind in their hour of trial.

The late Mr. Jas. Hodge.

A QUITE invaluable publication nowadays is the *National Federation of Assistant Teachers' Handbook*, issued by Mr. J. T. Boulter, Warwick House, Warwick Street, Leicester. For the modest sum of sixpence (post free) one can obtain practically all the information worth having concerning the status and remuneration of the certificated class teacher. The formation of the new Educational Authorities under the 1902 Act, and the introduction of new salary scales, must have given

The N.F.A.T. Handbook.

Mr. Boulter and his coadjutors a world of trouble. But the result of their labours is a production of which *any* organisation can be pardonably proud. Every student in his last year of college training, every certificated class teacher wherever he be located, and every member of every education committee should have this handbook at his elbow. Some six or eight pages of "Useful Facts and Figures" at the end are sufficient in themselves to supply material for the speeches and addresses of those anxious to further the "Assistants' Movement."

* * *

The Executive Election.

BY the time these "Notes" are published members of the Union will have in their hands the voting papers for Vice-President and Executive, and I fervently trust that they will regard it as a duty as well as a privilege to utilise the franchise. There are no contests in North England, Lancashire, and West England; but in most of the other districts the battle will be keen, and in some the issue is exceedingly doubtful. In Yorkshire and the North Midlands Messrs. F. W. Goldstone and W. B. Steer are opposing the sitting members. I know both these gentlemen sufficiently well to predict that they will, if successful, eventually take a distinguished position at Russell Square. In the South Midlands Miss S. Dix and Mr. Muscott strike one as having little chance of success, and the same may be said of Messrs. Baldwin, Day, and Roberts in East Anglia. In South England Mr. Holdaway and Mr. Penman are striving for a vacant seat, and the former gentleman, who has been before the constituency many times, will about win. I cannot venture to forecast the result in Wales, although of the new candidates Messrs. Nicholas and Pepperell seem to have the best chance of success. The metropolitan constituencies are a hard nut to crack. In North London Miss Jobson and Mr. Tutt are contesting Mr. Thompson's seat. Each has rendered yeoman service in the ancillary branches of Union work, and each would do well round the Executive Board. In East London Mr. R. T. Mawbey is the class teachers' nominee. Anything may happen in this division. South London witnesses seven excellent candidates fighting for four seats. I think Messrs. Bowers and Marshall Jackman are safe. I dare not prophesy further.

* * *

Some Withdrawals.

FOUR gentlemen do not seek re-election this year. Mr. Thompson has left the profession in order to take up a political appointment, for which his qualities are admirably adapted. Mr. Sparrow has been selected for the inspectorship of the borough of Salford, whilst Mr. Wright finds he cannot possibly devote the time to Executive work. Mr. H. Lewis is, I regret to say, retiring on account of indifferent health. I am particularly sorry at the withdrawal of Mr. John Wright of Liverpool, who is emphatically one of the strongest men the electoral district system has produced. If Mr. Waddington could be prevailed on to return as member for Lancashire, the loss would not be so great.

* * *

The Portsmouth Agenda.

FOLLOWING the excellent precedent established at Bristol two years ago, the Public Reception of Conference will be at 11 a.m. on Easter Monday. After the Portsmouth notabilities have been duly thanked, on the motion of Mr. Coward and myself, the President-elect will be installed and his predecessor decorated with the President's badge. Then will follow the reception of "foreign" deputations, of which the number this year is unusually large. The afternoon session is devoted to the President's address, and I anticipate a record attendance to greet Mr. Sharples. At Tuesday's public session the chosen subjects are Salaries, Superannuation of Teachers, the Teachers' Register, and Discipline in Schools. It is quite possible, however, that, according to custom, urgency may be moved to consider any important resolution of a purely educational character submitted by the Executive. At Wednesday's public session Examination of Scholars, Size of Schools and Classes, Appointment and Dismissal of Teachers, and Religious Tests, and Staffing of Schools furnish the *pièces de resistance*, and in my judgment these are a better set of subjects than those of the previous day.

A. C.

NOTES FROM THE NORTH.

King's Scholarship List.

THE Scholarship list, issued fully three weeks earlier than the corresponding list last year, does not afford to school managers very great hopes of meeting the scarcity that at present prevails in the teaching profession. The numbers in this case show a slight decrease from those of last year so far as presentations go, and an increase so far as the numbers who have been placed in the first, second, or third classes. The most striking feature in the returns is the number of pupil teachers who are taking the Leaving Certificate or University Preliminary Examinations instead of the Entrance Examination to the training colleges. It would look as if these were the lines of least resistance. One other point emerges from consideration of the statistics I give below—namely, that the actual number of teachers added to the profession is not increasing. In 1898 there were 1,371 who passed, and in 1903 the number is 1,362. Yet in that time the average attendance of pupils has vastly increased; in fact, we find from the latest Blue Book, issued this month, that during the past year there has been an increase of 19,788 pupils, which, at 60 pupils per teacher, would require nearly 300 additional teachers. The following are the statistics for the last six years:—

Men.

	Presented.	Passed.						Failed.
		1st Class.	Arts. 70, 95, etc.		2nd Class.	3rd Class.	Total.	
			P.T.'s	Non-P.T.'s				
1898	341	92	21	16	94	69	292	49
1899	327	82	28	10	107	69	296	31
1900	297	67	47	51	57	50	272	25
1901	254	37	82	35	46	31	231	23
1902	257	12	100	33	41	47	233	24
1903	254	12	95	44	42	45	238	16

Women.

	Presented.	Passed.						Failed.
		1st Class.	Art. 70, 95, etc.		2nd Class.	3rd Class.	Total.	
			P.T.'s	Non-P.T.'s				
1898	1304	308	48	17	460	246	1079	225
1899	1343	302	78	17	444	300	1141	202
1900	1239	230	152	61	362	255	1060	179
1901	1184	177	204	53	306	258	996	188
1902	1269	166	267	63	275	316	1087	182
1903	1284	184	304	76	265	295	1124	160

One other noticeable point is the increasing number who are entering the profession by other ways than the apprenticeship system. In 1898 there were 33 who were non-pupil teachers, and sought admission by the University or Leaving Certificates; this year there are 120.

I HAD expected that ere this time the new Scottish Education Bill would have been introduced, but it looks as if it were still as far off as ever. The Institute, however, has not let the grass grow under its feet; and if the Scottish Secretary and the Scottish members of Parliament are not fully aware of the wishes of the profession, it cannot be laid to the Institute's negligence. The organising secretary has been at Westminster for the last ten days, and has interviewed the greater number of our members of Parliament. A memorandum was prepared and sent to Mr. Graham Murray, embodying the points on which the Institute laid particular stress. Most of those points I have already referred to. The paragraphs dealing with the management of schools, denominational schools, and the superannuation of "existing" teachers, are, however, slightly altered. They read as follows:—

Memorandum on Proposed Bill.

MANAGEMENT OF SCHOOLS.

(*a*) That the Local Education Authority should not only control but also manage its schools through sub-committees of its own members.

(*b*) But should the Bill give powers to call in representatives of any other body (parish or town council, or both) to aid in the management of the schools, that the inclusion of such representatives should be optional on the part of the Local Education Authority.

(*c*) If such a composite body of managers be formed, that the representatives of the Local Education Authority should form a majority thereof; and

(*d*) That the powers of such committee of management should be clearly defined.

DENOMINATIONAL (VOLUNTARY) SCHOOLS.

That all public funds for educational purposes should be distributed solely through the Local Education Authority, which shall take adequate guarantees that such funds are devoted exclusively to education.

SUPERANNUATION OF "EXISTING" TEACHERS.

In view of the legal powers and traditional practice of Scottish School Boards to grant retiring allowances to teachers, and in view of the inadequacy of the amount obtainable by "existing" teachers under the Superannuation Act of 1898, that it should be made compulsory upon the Local Education Authority to supplement the retiring allowances of "existing" teachers under the Act by such an amount as will make the total retiring allowance of any such teachers at least equal to that which will ultimately fall under the Act to "future" teachers.

IN addition to the memorandum given above, which deals with the subject of superannuation, the Institute has also drawn up a circular on superannuation. In it the following paragraphs show what the Institute wishes:—"Scottish teachers feel that at the passing of the Act of 1898 their interests were sacrificed for the sake of establishing a homogeneous scheme, and this feeling is intensified by the fact that Section 12 (*b*) of the Act withdrew from School Boards in Scotland the power to supplement the retiring allowances, however inadequate, of teachers who accepted the Act. The fact that two hundred Scottish School Boards are at present known to be voluntarily paying the superannuation premiums of all or of some of the teachers in their service is indicative not only of the acknowledged inadequacy of the probable pension, but also of a desire to recognise the equity of a contribution from the Local Authority." The Institute is at present concentrating its energies on this point, in the hope that this may be embodied in the new Bill. But it has other objections to the Act. These, however, in view of the actuarial inquiry that falls to be made into the state of the Superannuation Fund in 1906, it considers inexpedient to tackle at present. There are fundamental objections to the principles of the Act, and it is to be hoped that in 1906 the teachers of Scotland will make clear these objections. There is every prospect that Scottish teachers will see the question of superannuation dealt with in the Bill. Whether it will be compulsory for school managers to supplement, or be left to them as optional, is, of course, still a matter that can only be determined when the Bill is introduced. The fact that during the last six years Boards have been freed from giving pensions may militate against the Government now compelling School Boards to supplement pensions. It will be a matter of great difficulty to get Boards to go back on the actual state of matters that existed prior to 1898.

Superannuation.

THE various branches of the Institute are at present considering the question of the salaries of rural headmasters. The scheme sent down by the General Committee is meeting with some opposition; but this is not an undesirable thing. The scale proposed is:—For head teachers in small schools with an average attendance under 100, a minimum salary of £100, rising to at least £160; for schools between 100 and 150 a minimum of £140, rising to at least £180; and between 150 and 200, a minimum of £160, rising to £200. House rent free, or a suitable allowance in lieu thereof, shall in all cases be provided in addition. Increments of at least £5 annually shall be granted until the maximum is reached. While I am strongly of opinion that a higher ideal might easily be proposed, yet it is to be noted that, according to last year's statistics, no fewer than 50 principal teachers in Scotland had less than £75 a year, and that 204 had less than £100, and 839 had less than £150. These facts show that there is in the present scheme at least a step forward. If we take the lady principal teachers, we find that 943 had less than £100. To put the matter otherwise, 1,093 out of 2,318 principal men teachers in Scotland—or nearly 50 per cent.—have less than £150 a year, and 943 out of 1,236 lady principal teachers—or fully 75 per cent.—had less than £100.

Salaries of Rural Teachers.

FULLY a month earlier than last year the Code for 1904 has been issued, and not a single word has been changed. This, no doubt, is due to the near prospect of a Scottish Bill. It was but natural that the Department should not make any changes till they saw what was going to happen. The authorities created under the Bill will not be hampered, therefore, with new regulations, and they will be able, as it were, to get their feet. R. G.

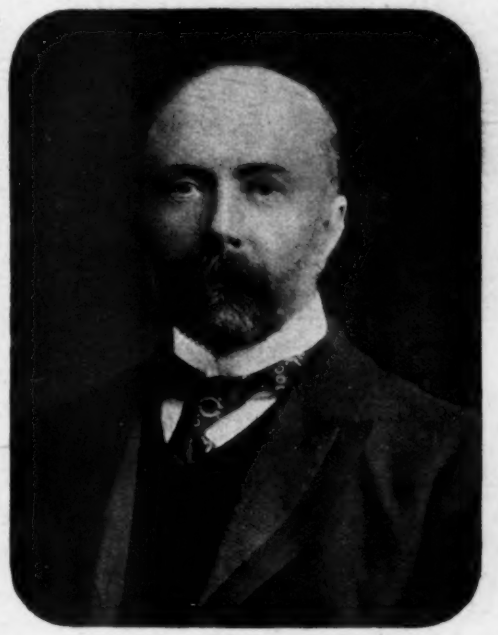
The Code.

THE CONFERENCE TOWN OF 1904.

PORTSMOUTH.

THE advantages of the great landlocked harbour upon the shores of which stands Portsmouth were recognised by the Romans, who reared defensive works at Portus Magnus, the present-day Porchester, now a small but picturesque village at the head of the harbour.

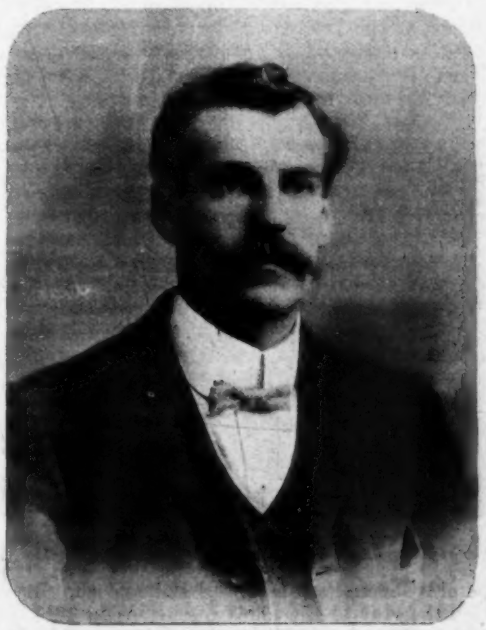
The birth of Portsmouth as a town may, however, be traced from the time of the Norman invasion, when, ships becoming larger and more frequent, the upper reaches of the harbour were deserted for the deeper waters at the entrance; so the little fishing hamlet of Portsmouth grew, until, at the time of the Crusades and the conflicts with France, it was the chief place of departure for our kings and their armies. Since then Portsmouth has been closely connected with most of the stirring scenes in the history of our country. Many a noble fleet has set forth from its harbour, and it is to-day the first naval port of the empire, a huge arsenal, and an important garrison town.



A. R. SAMPHIRE
(Chairman Conference Committee).

The old town of Portsmouth forms but a very small fragment of the great borough to which it gives its name. Portsmouth of to-day comprises Old Portsmouth, Portsea (with its great dockyard and magnificent naval barracks), Landport (the business centre), Southsea (the home of sunshine, and one of the most interesting and healthy watering-places on our coasts), Kingston, Buckland, Copnor, Milton, Fratton, and Eastney, with its splendid barracks, the palatial home of the Royal Marine Artillery. All of these at one time formed separate villages; they now nearly cover the whole of Portsea Island, a small islet three and a half miles long by two miles broad, separated from the mainland by a narrow inlet called Portbridge Creek, and bounded on the east, west, and south by Langstone Harbour, Portsmouth Harbour, and the Spithead.

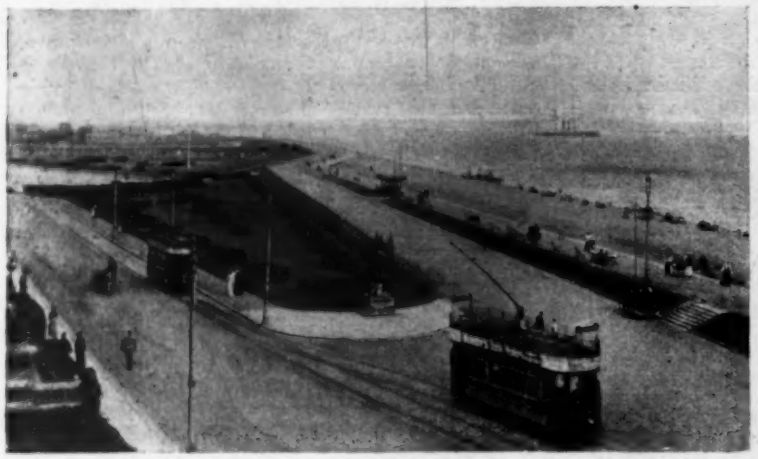
Langstone Harbour is a shallow inlet but little used. Portsmouth Harbour, with an entrance narrower than the Thames at London Bridge, has a low-water anchorage for large ships of 385 acres, and has



A. R. IVESON
(Vice-Chairman Conference Committee).

CHARLES T. WING
(Conference Secretary).

sufficient depth of water for the largest battleship afloat to enter it at all states of the tide. Here may be seen every type of warship, large and small, from the old wooden walls of Nelson's days to the most recent creation of scientific warfare—the submarine.



East Southsea Beach, from South Parade to Eastney.
(*Photo by Messrs. Russell and Sons, Royal Photographers, Southsea.*)

The Spithead is truly a world-famed anchorage, from which our fleets have ofttimes set sail in search of the foe. It has been the scene of many a brilliant naval pageant, and has in recent years witnessed the assembling of immense fleets representing the navies of the world.

One of the most impressive scenes it has ever witnessed took place in February 1901, when the remains of our departed Queen were borne over its blue waters through long lines of warships, saluted by the booming of hundreds of guns from the assembled fleet and the batteries on shore.

The Spithead is also connected with one of the saddest events in our naval history: it was here, in August 1782, that the *Royal George*, flagship of the "brave Kempenfelt," capsized on a beautiful summer's eve, and sank with all her crew.

The Conference Hall.

On alighting at the town railway station the visitor is immediately struck by the magnificent Town Hall, which stands in an open square immediately opposite the station. The foundation stone was laid on October 14, 1886, and the hall was opened by our present King and Queen on August 9, 1890. The cost of erection was upwards of £140,000. It is in the classic style, and was designed by the late Mr. W. Hill, F.R.I.B.A., of Leeds. The east or principal front is approached by a grand flight of gray granite steps flanked by lions, and leading to a portico with six massive columns. The tympanum is splendidly sculptured. In the centre is Britannia, supported by allegorical figures of Peace and Plenty. Each angle of the building is adorned with a cupola with vase-shaped terminals, while on each flank of the portico is a turret. From the centre of this façade rises an imposing clock tower which may be seen miles away on land and sea.

The interior of the Town Hall is in keeping with its noble exterior. The great hall—Conference Room for 1904—is situated in the centre of the building. It is 129 feet long, 70 feet wide, and 60 feet high, and a handsome balcony runs round three sides of it. At the south-east end is a very fine organ, which cost £3,000. The whole of this great hall has been recently redecorated. The building also contains the Council Chamber, Quarter Sessions and Police Courts, Coroner's Court, Grand Jury Chamber, Mayor's Parlour and Banqueting Chamber, Public Library and Reading Room, and offices for the whole of the municipal staff.

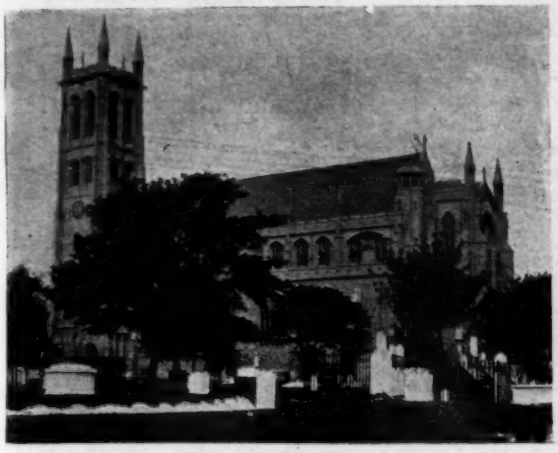
In addition to the Town Hall, Portsmouth possesses many fine buildings of great interest, such as St. Thomas's Parish Church, founded in 1173 and partially rebuilt in 1691, now undergoing restoration. Here may be seen the marriage register of Charles the Second, and a monument to Charles Villiers, Duke of Buckingham, Lord High Admiral, who was assassinated, in the High Street close by, by Lieutenant John Felton in August 1628.

The Garrison Church, dedicated to St. Nicholas and John the Baptist, all that now remains of the ancient "Domus Dei" founded in 1212 by Peter de Rupibus, Bishop of Winchester—in this church, then used as the governor's house, Charles the Second was married to Catherine of Braganza. In front of the east window of the church is an old mortar. This marks the site of the old Government House of Portsmouth. It was here, on the visit of the allied sovereigns in 1814, that the Prince Regent, the Emperor of Russia, the King of Prussia, the Duke of Wellington, Marshal Blücher,

Town Hall, Portsmouth.
(*Photo by Messrs. Russell and Sons, Royal Photographers, Southsea.*)

and Count Platoff, hetman of the Cossacks, surrounded by a host of princes and warriors, came forward on the balcony and drank success to the British people.

The Parish Church of Portsea (St. Mary's) is a fine



ST. MARY'S CHURCH, PORTSMOUTH.
(Photo by Messrs. Russell and Sons, Royal Photographers, Southsea.)

specimen of the Perpendicular style, the foundation stone of which was laid in 1887 by the late Empress Frederick of Germany. It was completed at a cost of nearly £50,000 (the late Mr. W. H. Smith, whose contributions amounted to £40,000, being the chief donor).

There are no less than eight large barracks in Portsmouth, in addition to which there are large hospitals and institutes for sailors and soldiers.

The principal barracks are the Royal Naval Barracks, recently opened for the reception of sailors previous to their going on commission—(they are the finest barracks of the kind in the world. Previous to the opening of these fine buildings sailors were housed in old hulks moored in the harbour)—and Eastney Barracks, the headquarters of the Royal Marine Artillery, which, with its fine parade-ground and gardens, covers an area of 64 acres. The other barracks are the Cambridge, Clarence, Victoria, Anglesea, Colewort, Broad Street, and Gun Wharf Barracks.

Literary Associations.

Portsmouth and Portsmouth men take an important place in the literature of the country. Charles Dickens, Sir Walter Besant, and George Meredith were born here. Rudyard Kipling, Conan Doyle, and Captain Marryat are also intimately connected with the town; whilst the author of the *War of Worlds* and *Mankind in the Making* worked as a shop assistant at Southsea.

Educational Institutions.

Portsmouth has always been well to the fore in educational matters, this being chiefly due to the fact that entrance into the dockyard—the aim of the majority of Portsmouth boys—is gained by competitive examination. The educational needs up to the passing of the Education Act of 1870 were chiefly supplied by private schools. On its election in 1871 the first School Board was called upon to provide places for some 7,000 scholars, the Voluntary schools being few in number and small in size. Up to the present time places have been provided for about 30,000 children, and some of the school buildings rank among the finest in the south of England. The Technical Institute is at present situated in Arundel Street, under the control of Mr. Oliver Freeman. This building being unsuitable, a fine structure is being erected on the Mayor's Lawn, immediately behind the Town Hall, at a cost of between £70,000 and £80,000. The Higher Grade School, situated in Victoria Road North, Southsea, was built in 1892, and has accommodation for 380 boys, in addition to commodious workshops. Mr. G. J. Parks, D.Sc., is the headmaster. Civil Service classes and classes for entry into the dockyard form an important part of the curriculum.

Portsmouth also possesses a flourishing Grammar School, providing education for boys for the army, navy, and civil services, a High School for girls under the control of Miss M. M. Adamson, B.Sc., and many thoroughly sound and well-equipped private schools for boarders and day pupils. Readers are of course familiar with the story of John Pound, the Portsmouth cobbler and the founder of Ragged Schools. It may interest visitors to know that the tenement in which he laboured, teaching the waifs and strays of the neighbourhood to read and write, is still standing in St. Mary Street.

Southsea Esplanade.

Given fine weather, visitors will doubtless flock to the Esplanade. Here they will find a broad walk and a carriage drive running parallel with and close to the sea for a distance of five miles, liberally supplied with shelters and seats, and marked by numerous monuments in memory of the brave.

The Esplanade is flanked by two fine piers, each of which has an extensive deck for promenading, and a capacious pavilion in which excellent concerts are provided.

EASTNEY BARRACKS.
(Photo by Messrs. Russell and Sons, Royal Photographers, Southsea.)

Midway between the two piers stands Southsea Castle, a fortress commanding the entrance to the harbour, erected by Henry the Eighth in 1539. It has recently been greatly strengthened.

From the Esplanade on a clear day may be seen the rolling downs of the Isle of Wight, dotted here and there with picturesque churches and villages.

CLARENCE PIER AND ESPLANADE, SOUTHSEA.
(Photo by Messrs. Russell and Sons, Royal Photographers, Southsea.)

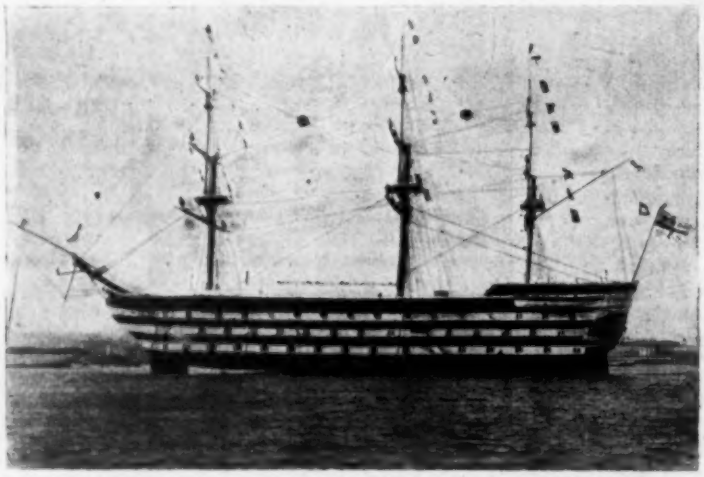
The immediate neighbourhood of Portsmouth offers many places of extreme interest to the visitor. Standing on the other entrance of Portsmouth Harbour is Gosport, with its large victualling yard, its Royal Naval Hospital and Museum, and its barracks, the headquarters of the Royal Marine Light Infantry. Farther up the harbour lies Whale Island (H.M.S. *Excellent*), made from the material excavated when making the large basins in the dockyard. This is the school for naval gunners. Not far away lies moored H.M.S. *Vernon*, torpedo school and school for naval experiments; whilst midway between Gosport and Portsmouth lie Nelson's old flagship, H.M.S. *Victory*, and H.M.S. *St. Vincent*, another of our old wooden walls, now used as a naval school for boys.

The Week's Programme.

In addition to the numerous business meetings which usually occupy the time of a Conference representative, the Local Conference Committee has made strenuous efforts to provide ample opportunity for the pleasure-seeker, and a glance at the following programme of social events will show how far its efforts have been successful.

Thursday, March 31st.—Reception by Conference Committee.
Good Friday, April 1st.—Excursions by boat and rail.
Saturday, April 2nd.—Cycle rides to Chichester and Harting.
Monday, April 4th.—Reception by the Mayor in the Town Hall, 8 p.m. to 10 p.m.
Tuesday, April 5th.—*Morning:* Visit to the Royal Naval Barracks. *Afternoon:* Visit to Whale Island. *7 p.m.:* Conference Dinner. *8 p.m.:* Grand Charity Concert.
Wednesday, April 6th.—*Morning:* Visits to H.M.S. *St. Vincent*. *Afternoon:* Visits to H.M. Dockyard and Gunwharf. *8 p.m.:* Ladies' "At Home" in the Town Hall—College Reunions.
Thursday, April 7th.—*Morning:* Visits to Royal Marine Artillery Barracks and to H.M.S. *Victory*. *Afternoon:* Visit to H.M.S. *Vernon* (where several naval experiments will be shown). *8 p.m.:* Complimentary Smoking Concert in Masonic Club. *9 p.m.:* Conference Ball in the Town Hall.
Friday, April 8th.—Excursions: 1. Winchester; 2. New Forest; 3. Isle of Wight.
Saturday, April 9th.—Excursions and Visits—Cycle rides to Droxford and Midhurst.

During the week visits will also be arranged to the Royal Naval Hospital and Museum at Haslar, the ancient Parish Church of St. Thomas à Becket, Porchester Castle, and Portsmouth Museum.



H.M.S. "VICTORY," NELSON'S OLD FLAGSHIP, FLYING THE FAMOUS SIGNAL, "ENGLAND EXPECTS EVERY MAN TO DO HIS DUTY."
(Photo by Messrs. Russell and Sons, Royal Photographers, Southsea.)

CHARLES T. WING.

A MAY-DAY FESTIVAL.

BY CHAS. F. HAYWARD,
Author of "Christmas Letters."

AS an institution formed for the purpose of relieving the burden of constant work, and of teaching something of the bygone customs of Merrie England—both very desirable features in school life at the present day—nothing has here been found to be more successful, from every point of view, than a festival on the 1st of May. Children, parents, teachers, all take an interest in it; for the preparation necessary for its success is light, and the pleasures which come from its adoption are not few. Its scope can be made as wide as the enthusiast with unlimited resources can carry out, or it may be narrowed down to suit the environments of the smallest school. It has this advantage: from the youngest child in the baby room of the infants' school to the senior boy or girl of the upper departments, every one can take a share in it.

In these enlightened days of free curricula, managers are delighted to take their share in its celebration, and inspectors recognise it to be an object lesson of the very best and truest form.

On introducing it into a school, it will be necessary to explain to the children the meaning of it, and what it is all about; for many of them, especially those whose lives are spent in busy centres of dusty toil, will not understand it.

It has dropped out of the national life. The teacher is afforded the privilege of reviving it, and many will take the opportunity of doing so.

As far as the history of a May-Day Festival is concerned, one may go back a long way and find an indication of its popularity. The name *Maia* suggests an old-world fancy. But let us confine ourselves to our own old customs. The children will be more interested in these, and put more soul into the festival in consequence.

In Anglo-Saxon times May was looked upon as the month of promise, of growth; and, no doubt, the opening of the "coming summer" was celebrated by our Saxon forefathers in very much the same way as by those who lived in Tudor times, though there is no positive proof of it. King Hal was wont, we know, to attend a May-Day Festival, and he revelled in its playful yet innocent sports. Londoners joined in parishes, and each parish vied with each other in producing the best celebration. To musical strains as well as to the harsh notes of horns, they marched to the fields and lanes, cut branches of trees, and carried them in triumph home, and made their streets look veritable bowers of woodland. And this, too, at an early hour of the morning. In Shakespeare's time men wished each other "A Happy May-Day," as we now wish each other "A Happy New Year." They meant it, and they sang to their hearts' content as they danced round the gaily-dressed maypole. Every village of size possessed its own pole, and every lad and lass joined in the fun. Popular characters were personated, and among them Maid Marian and Robin Hood always found a place.

Then there came a lull, but not because the people were weary of it. The sober-minded Puritans saw harm in the jests, the pranks, and the mimicries; and perhaps they were carried too far. Who knows? James the First came to the rescue, and in his *Book of Sports* he showed a more open mind than did the zealots for religion. In Cromwellian days they were entirely suppressed, only once more to be revived at the Restoration. In these more sober days, when business is uppermost in men's minds, and solid gain is of more importance and urgency than anything else—save, perhaps, the biweekly football match—the places are few and far between where May-Day Festivals are celebrated. There is no reason why they should not be encouraged in the lives of our little folk. They may be simple and pure in form; and, perhaps, the simpler they are arranged, the closer is the idea to that of olden times.

A month's preparation for it is sufficient, and this can be effected in the singing and recitation lessons, with an occasional rehearsal with the whole of the

children together. Of May-Day songs there is no end, and the poets can be drawn upon to supply suitable verses for declamation.

In this school—Somerville Road, Birmingham—May-Day work is commenced after the Easter holidays. First of all, a Queen of the May is chosen. She is selected from Standard VI. by the girls of that class, the reason being that in all probability she will remain in the school at least a year after the festival. Now that the custom is well established—we have crowned seven queens—the girls experience no difficulty in making a wise and judicious choice. The queen must be winsome, kind, of gentle manner, and of high character. She must be a girl thoroughly representative of the best and truest instincts of youth, not vain, selfish, obstinate—in all respects a model girl.

On a certain morning, after due notice has been given

that the election will take place, slips of paper are handed round, one to each girl. A name is written in secret thereon, the papers are folded and collected, the votes are sorted and totalled. Even the scrutineers are appointed after nomination by the class. Soon "the popular girl" is declared and congratulated, and on the same day the whole school knows upon whom the choice has fallen. Then a start in the preparation is made. As time goes on and the work expands—there is no end of suggestions for development—maids of honour are elected. To supply these, each class of girls sends a representative, and in addition the Queen of the May asks her own special friend or playmate to be her chief maid. Two tiny maids are also sent by the children of the infants' department. In all, the number generally runs to ten or a dozen. A prince, a herald, and two pages make up the total of those who take part in the coronation.

May Morning opens, as a rule, fine and bright. The children have been up early, and each has secured overnight a bunch or garland of flowers. They come to the school long before the usual hour, and deposit their floral tributes with the marshals who have been deputed to receive them. The two classes of Standard VII. children spend an hour or so in arranging the flowers about the hall of the school: some are set in gay array on the window-ledges, some over the pictures, and some in vases on the piano. The throne is gorgeously decorated, and the dais on which the throne is placed is one mass of palms, plants, and flowers.

The queen names her favourite flower. With as good specimens of this as can be secured the crown is made.

By half-past ten the children, after having been allowed an earlier "play-quarter" than usual, are assembled in the hall. There is room for the children of all three departments. Good discipline is necessary, for the excitement is great.

The festival begins with the entry of a herald. He is dressed in proper costume, and carries a scroll. This, however, he does not use, for he knows his "part." Standing in the open space in front of the children:—

Herald. May Morning has come once more. All nature is awake, and everything tells of happy summer days to come. The lark in the clear blue sky sings his merry lay, the trees and the flowers shoot out their pretty buds, and the children are met to show their joy at the promise of lovely summer skies. Children, I wish you all mirth, all happiness. May your joys be as pure as Nature's flowers!

Fairy [*who has tripped in lightly behind him*]. Yes. We know that May is here. This is the opening day. Hurrah! May-Day! [*Walking nearer to herald*] We are going to crown our queen. The votes have been cast—all fair—and some one has been chosen, who is kind, and winsome, and—everything that's good. Shall I tell you who it is?

Herald. Yea, I should like much to know.

Fairy. It is [*name of queen*]. She is ready, and awaits our call. Retire. Convey to her our greetings of good-will, and bid her come to take possession of this her happy realm.

Herald. Your wishes shall be carried out. I hasten your commands to obey. [*Bows and retires.*

Fairy waves her adieus to herald, then turns to children, and asks for a song during the wait. A chord is struck on the piano, and the children sing,—

"Come, Gentle May!" (*Gatti*).

Fairy. Sh! The queen cometh not. Wherefore this delay?" [*She sings.*

"Come, lovely queen,
Come, lovely queen,
Queen of the Maytime, I call thee now—
Come, lovely queen."

Doors are opened at the side of the dais, and procession enters. Children with garlands, dancers, maids of honour, and last year's queen (if possible), and queen's maid. Queen enters, followed by two pages, one holding a cushion on which a flower-sceptre is placed, and the other a cushion with crown. A prince with a garland follows. These arrange themselves in two lines which form a passage to the throne, down which the queen proceeds. She stands on the lowest step of the dais, with face turned to children, who sing,—

"We'll crown our queen with [*favourite flower*], roses, lilies, daisies, etc." (*Novello.*)

Song finished, the prince advances and bows to maid of honour, Standard VI.

Prince. May clothes the land with flowers, and it is meet that our queen should be decked with the beauty that May has caused to grow. As Prince of Somervillia I am come to offer a garland of beauty to the Queen of the May. It is the gift of the youth, the strength of the land. Will you ask her to accept it from me?

Maid. Most noble lady, this prince has an offering of flowers, which he bids me ask you to accept. What shall I tell him?

Queen. Say to him that his thoughtful kindness is very much admired by me, and that I shall wear the garland to keep me in mind of the youth—the flower of the land.

Maid. [*To prince*] Her Most Gracious Majesty greatly appreciates your thoughtfulness. [*Turning to queen*] Thou art the Queen of the May. As May throws over the land bright garlands of beauty, my loyal duty is with loving hand to fling this beautiful garland over the neck of our queen.

[*Queen bends and is garlanded.*

Queen. "For thy loyal hand to deck
Low I bend my royal neck.
Lovely is this garland gay
That adorns your Queen of May."

[*Prince and maid retire.*

Page, with crown, advances to queen's maid.

Page. "The garland is gay
For the Queen of the May;
Its (lilies) are pure,
Of that I am sure.
But she shall be crowned
For every one round,
Our beautiful Queen of the May."

[*Page hands crown on cushion.*

Queen's Maid. "Spring is the queen of the year,
And May is the queen of the spring.
Thou art the Queen of the May, most dear.
And so thy crown I bring.
Bend thy beautiful head, I pray,
That I may crown thee Queen of the May."

During the crowning the children sing the last verse of "We'll crown our Queen."

Queen. "Brighter far than gold or gem,
Is this flow'ry diadem.
May my reign all peaceful be
Nought but happiness let's see."

Page, with sceptre, advances to last year's queen.

Page. "Our darling last year's Queen,
Right royal have you been;
But now your reign is o'er,
Another Queen must soar
To might,
And wield this flow'ry sceptre bright."

Last year's queen takes sceptre, and offering it to the Queen of the May, says—

"Fair [*name of girl*], now thy sceptre hold,
Emblem of my power of old.
May Queen was *I* last year, but now
To thee most humbly do I bow.
Hail, gentle Queen!
Dear Queen!
Rule, most noble, lovely Queen."

Queen. "[*Name of girl*] dear, this sceptre bright,
Token of my power and might,

Wielded shall be o'er land and sea,
In love, in modesty by me."

The queen is now assisted to her seat on the throne, and her maids, pages, etc., arrange themselves round her in a group. After this the children sing a loyal song, in which they promise,—

"Obedient we'll be,
We'll not give her trouble,
No sorrow she'll see."

Then when things have settled down, the revels, as we call them, commence—(selections of songs, recitations, dances, etc.).

CORONATION GROUP.

"She's on her throne seated,
So young and so fair,
Our dear little playmate
With bonnie brown hair."

When the maypole dance is over—and this is always performed by children from the infants' department—the queen comes down to the lower step of the daïs and delivers her speech.

The following show the nature of the queen's speech.

1901.

MY DEAR AND LOYAL SUBJECTS,—You have done me great honour to-day, and I hope I have well deserved the many kind things you have said and sung about me.

As your Queen for a year, I will do all I can to show you how to be loving, and gentle, and true. If, as I leave this throne, I may express the desire of my heart, it is that *you*—all of you—may grow in goodness as you grow in years.

Be noble in act, in speech, and in thought, and you will be happy because you will be good. My blessings I shower on you. Farewell!

1902.

MY DEAR AND LOYAL SUBJECTS,—As long as I live I shall remember this happy day. I shall think of it many times, and I dare say I shall dream about it too. In memory I shall see the smiles, the glad faces, and the happiness of you all. I shall hear the merry songs, the music of which has made us all so glad, and I shall enjoy over and over again the lightsome steps of those who have so prettily and so gaily danced on this village green.

I thank, from my heart, the little ones—my youngest subjects—who have so beautifully performed the old but ever new Maypole Dance. Without the help of these, our little "make-believe" would have been incomplete.

But, my subjects all, I have another expression of thanks to make. It is to my nearest and dearest companions. They chose me as their Queen when they might have made another choice. I am glad they think so highly of me, and I hope I shall always enjoy their affection and their love. What I have done to make them love me I have never missed. It has cost me nothing. But it has brought me treasure very precious—it has brought me the happiness of knowing that by loving I have been loved.

And now the festive day is over. I leave the throne, happy in the thought that I am privileged to bless you all.

May health and prosperity always attend you! May the comfort of a pure mind, a kindly spoken word, and a noble deed be yours always! Farewell, my subjects! Farewell!

1903.

MY DEAR AND WELL-BELOVED,—You have been happy and glad on this bright May Morn. Your songs and games have made you feel that life, with blessings, is a great gift. Use it well.

While you are young, you have little care. Your disappointments are few, and it is good you know not that sorrow and pain may come some day.

To you, whom I love so well, I wish long life, clear of every stain. May your days be all sunshine—heart sunshine—and your nights contentment, rest, and peace!

I have watched your fun. It has given me pleasure beyond even what a queen can express. It has gladdened my heart,

and you will, I am sure, not deny me the joy to hope that every Queen who may sit on this throne may be in her time as happy as I have been this day.

Your love, your expressions of good-will, I shall remember always, and with you I trust that my reign will be happy and bright—happy because you live under a rule that is just, and bright because you do the things that are right.

How much I love my people dear,
None save myself can tell!
May Heaven you send no ills to fear!
My subjects all—Farewell!

To write a queen's speech, suitable both to the queen herself and to the special circumstances of her election, is as difficult a task as that of writing a Christmas letter. Every point must be carefully considered—the queen's own personality, her powers of recitation, as well as any special point it is thought well to bring out. The speech for 1901 is short, for example. On that occasion the queen's pure mind and honest heart did not endow her with the gift of oratory; while on the two last occasions the queens could have recited a speech of any length. We are hoping that some day a queen will be chosen who will be able to sing the speech, or, at least, a song from the throne; but as yet it has never happened. The teachers put this down to the fact that the soloists get as much attention as is good for them, and that the children know it. They are always in the fore of everything, and perhaps that accounts for a good deal.

The queen's speech is listened to by the children with rapt attention, especially by the elder children, who, knowing the character of the queen, applaud justly the points as she brings them out.

At the close the maids of honour come down from their places on the daïs, and rearrange themselves in rows. The queen is assisted down, and as she passes along and out of the room flowers are strewn in her path. Then the whole assembly breaks out in the National Anthem, and the "coronation" is over, and the next one eagerly looked forward to.

MENTAL BACKGROUNDS.

BY J. ADAMS, M.A.,

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OF all the sciences, psychology is perhaps most given over to metaphor. Nor is this in the least surprising. Its subject matter is so intangible, impalpable, elusive, that it is only natural that our concrete-loving minds should seek the help of familiar figures. From the naïf myths of Plato, down to the latest illustrations of the American psychologists, we have a long series of more or less helpful pictures of mental process. Hume, for example, invites us to regard the ideas as the players and the mind as the stage. Here the atomistic character of the relation between ideas and mind is prominent. The ideas are related to each other by nothing but association, and the mind has nothing to do with the matter beyond giving the ideas a place to disport themselves. From this point of view the ideas form series rather than masses. The associationist position, in fact, may well be represented by another figure.

Imagine the mind to be an hour-glass. The upper bulb contains the ideas that are not yet in consciousness, but are on their way. The lower bulb contains those ideas that are now out of consciousness, but have just come from consciousness. Only the grains of sand that are actually passing through the narrow neck between the two bulbs represent the ideas that are in consciousness: that is, only one idea can be in consciousness at a time. To be sure, the figure breaks down because it does not provide any means by which an idea may pass from the lower bulb back to the higher without again passing through the neck; but it emphasises the radical blunder of the associationists—the seriatim progress of the ideas. Ideas are not strung together like beads on a rosary, but are grouped together in masses.

It is for this reason that Professor James's figure of the *stream of consciousness* is so useful. The content of the mind has not only extension, it has bulk. Mental process may be represented by a deep and strong river. At any given point the total body of water is continually being renewed, and yet there is no break between what has gone before and what is coming after. Perhaps the midcurrent on the surface may most fitly represent the area of focal consciousness; but all the surface may be regarded as in the area of consciousness. Along with the focal elements there are all manner of side eddies, in which the current of consciousness appears to be going in quite a different direction from that of the general current. Further, the deeper parts of the river—the body of the stream—may represent that great mass of ideas that are not actually in the consciousness, but exercise an important influence on the consciousness. The trend of thought may be in one direction, while here and there are found little circles of thought in which this direction is reversed. At any given moment the flow of water in a river is the resultant of many conflicting forces, so the action of the mind is the resultant of many mental characteristics and tendencies, each exercising its power for all it is worth. The resultant of all the forces present in the mind often makes itself felt as a sort of *tone*. The great bulk of the stream of *mental life* may not be entitled to a place in the stream of *consciousness*, and yet may have a great influence in determining the tone, and thus indirectly the direction of conscious life.

The stream figure no doubt serves admirably to check the tendency to atomism in psychology. It emphasises the solidarity of the mind. But as a consequence it makes it difficult to deal with the elements of the mental content. For purposes of analysis and exposition it is well to speak of the idea and of the mind separately, though we must never forget that in the last resort the idea and the mind are one.

At this point one is strongly tempted to accept the physiological explanation, and regard the multipolar cells of the gray matter of the brain as the seats of ideas. We are told that there are 600,000,000 (according to others 1,200,000,000) of these cells in the brain, which appears on the surface at least as large an allowance of ideas as is necessary to carry on the mental processes of the average man. But after we have accepted the physiologist's theory, we find that we are no farther on than before. Even if it be true, the physiological theory carries us a very little way in our search after guidance in directing mental process. As a matter of fact, the physiological theory is nothing more than one figure among the rest: it does not make the ultimate relation among the elements a bit easier to follow.

Keeping all this in view, we may perhaps be permitted to make a metaphor of our own, that for the time being neglects the radical unity of mind and ideas. This is done in order to make clear the mode of interaction

among the various states of mind, and in particular to illustrate the effect of the mass of content just outside the range of actual consciousness.

Let us compare the mind to that drawing-room toy called a kaleidoscope. This consists of a tube, within which are placed three oblong pieces of glass, in such a way as to form a hollow triangular prism within the tube. Since the inside of the tube is dark, these pieces of glass become mirrors that reflect any objects that may appear at the ends. One end is closed up entirely, except for a little peephole for the spectator's eye. The opposite end is stopped up with a circular piece of ground glass that is translucent but not transparent. Within the tube, and almost touching the ground-glass disc, is another disc, but this time of clear, transparent glass. Between the two discs are placed a number of very small pieces of coloured glass. If the spectator now turns this tube on its axis, while keeping his eye at the peephole, he sees the pieces of coloured glass reflected in the mirror-sides of the hollow triangular prism. The result is that a great variety of very pretty geometrical patterns make their appearance, and these vary with every turn of the tube that displaces the pieces of coloured glass.

Here we have a figure of the mind. The mirrors represent the mind itself, the coloured glass the ideas. Clearly the total effect depends as much upon the coloured glass as upon the mirrors. The laws of reflection remain the same whatever the nature of the things reflected; yet if we can change the materials to be reflected, it is obvious that we can make an important change in the total character of the reflection. It is easy to see, for example, that we could have half a dozen kaleidoscopes each having a special tone of its own. It is usual to supply pieces of glass of very brilliant colours, mostly primary, and strongly contrasting with each other. But there is nothing to hinder us from supplying one instrument with only different shades of green, another with different shades of blue, a third with only complementary colours, and so on. We could thus have instruments made of only primary colours, others of secondary, still others of tertiary, and within each of these classes we might have an infinite variety of grades and combinations. Further, we could modify the size and shape of the pieces of coloured glass. We could have instruments with circular elements, others with hexagonal elements, square elements, triangular, octagonal, and so on. Further, we could combine the pieces of coloured glass in various ways before placing them in the space between the two discs. In an ordinary kaleidoscope the size and shape of the coloured elements are largely left to chance. But it is quite conceivable that one might desire to limit the possible combinations of the elements. I am told that the designers of patterns for carpets and wall papers sometimes fall back upon the kaleidoscope for ideas, and that they find in it an almost inexhaustible supply of forms. Now suppose that the designer desires to introduce some special form—say, a particular leaf-form: he might introduce one or two of these forms among the ordinary pieces of coloured glass. Or he might want a certain combination of colours: then he might make a series of duplicates of this combination, and place nothing between the discs but this series. If the series had the same shapes as well as the same combinations of colours, the possible changes caused by the reflection would be correspondingly limited. In other words, the results can be very directly modified by modifying the material supplied.

Can any corresponding change be effected by altering the instrument itself? The laws of reflection are invariable, and whatever the material supplied, the triangular prism will react upon them in a definite way. We can calculate upon a given result if we know the material supplied, and the laws according to which the mirrors act.

Apply this now to the mind. It is patent that the instrument itself corresponds to the mind, and the pieces of coloured glass to the ideas. The instrument does not change; the laws of the mind remain constant, however much the material upon which they act may vary. Yet the resulting mental effects may differ as widely as do the kinds of kaleidoscopic effects described above. There are minds which, as complete wholes—that is, as wholes made up of original endowment combined with presented content—differ as widely among themselves as do the primary, secondary, and tertiary kaleidoscopes. By selecting the material upon which a mind is to work we may greatly modify the resulting character. The nature of a man at any given moment depends upon two things—original endowment and acquired mental content. In this way what is commonly called instruction has a great deal to do with the nature of the person instructed. The information supplied to the mind may be given pell-mell, without any order of arrangement, as in the nursery. Here we are dealing with the mere scraps of broken glass. But on the other hand, it may be presented in certain more or less fixed combinations, as in school; and the more complex the combination, the less the freedom of the educated to react upon it in a perfectly independent way.

In connection with freedom of combination, a most interesting point emerges. We are taking it for granted that the mind must combine according to certain laws; we assume that all minds act alike. In the ultimate resort this is demonstrably true. There are certain fundamental laws to which all our minds must conform. These laws are to be found in such books as Thomson's *Outlines of the Laws of Thought*. The useful part of books on logic is taken up with statements of these laws. All this merely amounts to saying that we are all triangular-minded. It is quite possible to make a kaleidoscope with four mirrors instead of three, and it is conceivable that there are minds that correspond to such an instrument; but they are not human minds. There is no logical connection between the numbers, but it is interesting to note that we are creatures of three dimensions—length, breadth, and thickness; so the triangular prism very fitly represents our limitations in the way of mental reaction.

That minds differ among themselves is a commonplace; but they differ in quality, not in form. Newton and the plucked candidate for matriculation work with the same hollow triangular prism, though the quality of the Newtonian mirror may be somewhat better.

But the mind is limited, not only by the combinations formed in the materials presented to it, not only by its own triangularity, but also by the combinations already formed from within. For here we have reached the point where the figure, after the manner of figures, breaks down. The reflections cast by the coloured glass are certainly limited by all the laws of reflection; but the reflections disappear, and leave the mirrors exactly as they found them. In the mind things are different. The mind is never the same mind after it has been acted upon by an idea. Since ideas are only the reaction of the mind upon certain forces, it follows that if these

persist at all—as experience seems to prove that they do—they must persist simply as effects upon the mind. They are nothing more than tendencies of the mind to act in a certain way. But whether we regard ideas from the subjective or from the objective side, they exercise a powerful influence upon any new ideas that may be presented to the mind. We cannot but regard a new idea in the light of the old. An arrangement may be made by which a given piece of coloured glass could be introduced into the centre of the field of vision of a kaleidoscope. The effect of this piece of glass would vary greatly, according to the nature of the pieces already there. By introducing the same piece of glass into several kaleidoscopes, each having a different tone, the difference in effect will be at once manifest.

Painters are familiar with the phenomena of what they call turbid media. Colours vary according to the material upon which they are laid. Listen to what John Collier, the distinguished painter, has to say on the subject:—"Rub a little ivory black thinly over a white canvas—it will appear a distinct brown; mix the same colour with white—it becomes a neutral gray; brush this gray thinly over a black ground—it will have a distinctly bluish tinge. So that the same pigment can vary from a warm brown to a blue-gray without admixture with any other colour but white, merely in accordance with the manipulation it receives. Yellow ochre gives similar results. When lightly brushed over a white ground it seems a rich orange; when brushed in precisely the same way over a black ground it seems a sort of green."

So with the soul. The same idea has to harmonise itself with quite a different tone according to the nature of the mental background against which it is projected. Public speakers of a sentimental turn are not uncommonly guilty of falling into a sort of "Ah!" strain, that renders them blind to the real value of the ideas they use. The emotional background is too much for the ideas projected against it. In cold blood the orator usually sees his mistake, but the following example proves that the background may maintain its power even through the callous period of proof-reading. It occurs at the end of a sermon to children by a distinguished clergyman, who published it along with others in book form in 1891:—"And away down in Eighty-first Street a woman was stitching what seemed like a little night-gown. But, ah me! it was not that—it was something sadder still, for her dear little baby had died; and the mother's heart was full, and the tears would flow." Apart from the background, no one would think that "a little night-gown" was a particularly sad object—only less sad, in fact, than a little shroud. But so powerful is this background of sentiment that not only did it blind the preacher, but it completely deceived two different classes of divinity students to whom I had occasion to lecture, and upon whom I took the liberty to experiment. I read the passage—naturally beginning a little bit before the dangerous part, so as to give the background its proper effect—to illustrate another psychological principle. In both cases the absurdity escaped detection, though the young men were extremely disgusted at missing it.

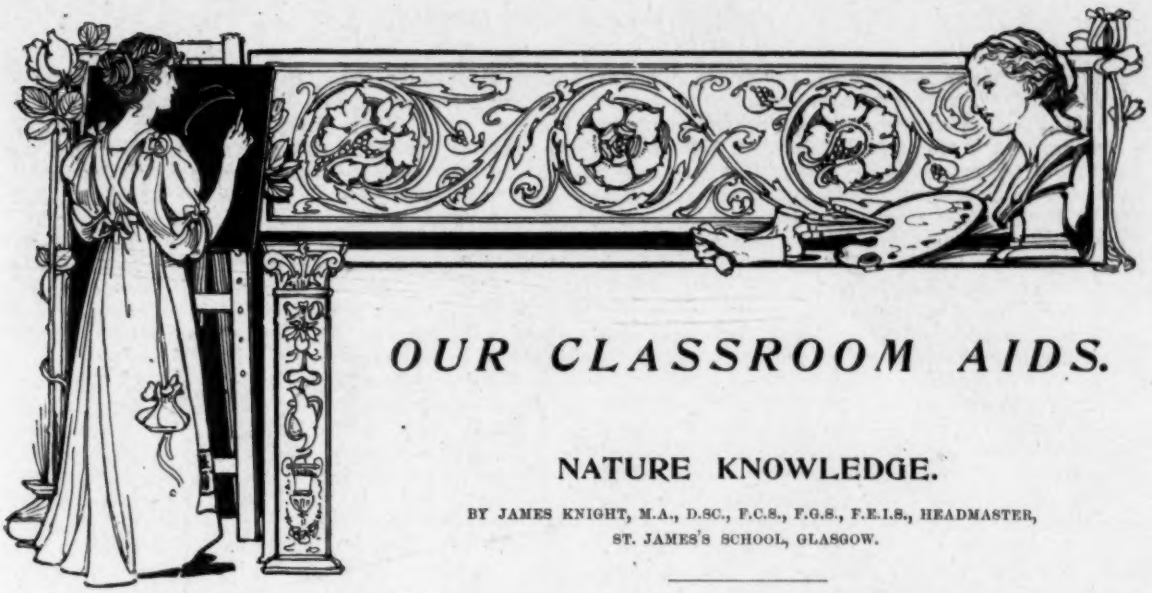
Each idea presented to the mind must make itself at home among the ideas it finds there. It must harmonise itself with its surroundings, and must take a different tone according to the mental background against which it is projected. The presented content may be quite neutral, or may have a positive content of its own. In both cases the new idea must submit to take its tone from the background.

What could be more colourless than the sentence, "Think of him." Yet note the difference in tone according to the following backgrounds:—A religious revival meeting; a picture in *Punch* of a low-class photographic artist trying to encourage a pleasant expression on his female sitter's face; a widow laying flowers on a grave; a schoolmaster during the Franco-Prussian war pointing to a portrait of the first Napoleon; a couple of starving "unemployed" watching the Lord Mayor pass from his carriage to the dining-hall; a Fenian meeting where a traitor has been mentioned.

The same thing is true of a concrete idea—say a fish. Note how the emotion aroused varies according to the background. Against a background that includes the early Christians and the Catacombs it rouses either a deeply religious or a mildly antiquarian interest. Try it now against a background of astronomy, sport, bread-winning, geography, art, science, slang, heraldry, asceticism.

Most of the honest—that is, unmalicious—misunderstandings of life are the result of failing to make allowance for the background in the mind of another. When the same ideas are presented against different backgrounds, the resulting confusion is so inevitable that we have a phrase to express this special form of misunderstanding. When people are at "cross purposes" they are dealing with the same ideas in different connections—in other words, against different backgrounds. Here we have passed beyond the mere tone, and have reached the region of relation among the elements that make up the content of the mind. The careless, unreflective man takes it for granted that the idea he sends forth from a given background will find a corresponding background in the mind of his hearer or reader. Fortunately his expectation is usually justified. By the very fact that two minds are in communication they are placed in such a relation as to encourage the development of the same backgrounds. But at the very beginning of a conversation there is sometimes a little difficulty. The preliminary talk between two persons before coming to the real point is a sort of tuning up—a kind of mental feeling for the proper pitch. This preliminary talk has often been compared to the few passes that a pair of fencers make before coming to the real business of the encounter. But the figure of the pitch is nearer the truth. Many people—particularly young people—are exceedingly irritated by what they call "beating about the bush." No doubt the principle *in medias res* is admirable, if we are sure that we and our interlocutor are to be in the middle of the same *res*. If two men meet to discuss the same subject, they are probably provided with similar backgrounds; but even then it may be desirable to harmonise them. It is quite possible that each may view the subject against a background quite differently made up, though composed of the same materials. People who argue for the sake of arguing—people who write to the newspapers—almost invariably deal with ideas in the light of their own backgrounds, and refuse to take the trouble to discover the mental backgrounds against which the same ideas are projected in the mind of the person with whom they debate. If we desire to convince another person that his view is wrong, we must endeavour to find out exactly what that view is; we must discover what sort of background his ideas are projected against.

(*To be continued.*)



OUR CLASSROOM AIDS.

NATURE KNOWLEDGE.

BY JAMES KNIGHT, M.A., D.SC., F.C.S., F.G.S., F.E.I.S., HEADMASTER, ST. JAMES'S SCHOOL, GLASGOW.

LESSONS ON FOODS: PROTEIDS—ALBUMINOIDS—EXTRACTIVES.

IN addition to the proteids strictly so called, nitrogenous foods comprise two other divisions, each of considerable interest and importance. One of these is the class represented by gelatin and all animal jellies; the other consists of extractives—that is, substances which may be extracted from meat by various solvents, more especially by water. And of these we have familiar examples in soups of all sorts, and especially in beef-tea.

The gelatin division are sometimes called albuminoids, since they resemble albumen in chemical analysis, though they contain little or no sulphur. Analysts divide them into four groups as under, but only the first group enters into food supply :—

I. Collagens or gelatins, soluble in boiling water, and forming a jelly on cooling. These contain little or no sulphur.

- Gelatin proper, from bones, skin, connective tissue.
- Chondrin, or cartilage gelatin.
- Isinglass, from the swimming-bladder of fishes.

II. Fibroïds, soluble in strong alkalies, but not affected by dilute acids; they contain no sulphur.

- Elastin, from elastic ligaments.
- Fibroïn, the basis of silk and spider's web.

III. Chitinoids, not affected by water or alkalies, and also containing no sulphur.

- Chitin, the horny skeleton of insects and other invertebrate animals.
- Conchiolin, the animal basis of mussel and other marine shells.
- Spongin, the animal basis of sponge.

IV. Keratins, an important class, soluble in boiling dilute caustic alkalies, and all rich in sulphur.

- Keratin, the animal basis of hoofs, horns, feathers, hair, wool, and other skin structures.
- Neurokeratin, from brains.

This last group may be dismissed in a sentence or two. Everybody knows the disagreeable odour given off by burning feathers, horn, hair, or even wool, an odour so strong in ammonia as to be used in cases of fainting. The old name of ammonia, indeed, is spirits of hartshorn. The keratins are all rich in sulphur, human hair containing 5 per cent., and it is to this that most hair-dyes and so-called "restorers" owe their efficacy. These dyes are almost all compounds of some heavy metal which forms a black sulphide, such as lead, bismuth, copper, and silver; consequently, when hair-dye is used, the metal of the dye combines with the sulphur of the hair, forming the black sulphide. The action is the very same as that of an egg upon a silver spoon. Of course there are no hair "restorers," in spite of advertisements; none of these mixtures professes to restore, say, red hair to its original colour.

The second and third groups call for no remark, except to mention the interesting fact that silk is akin to glue and gelatin, and may, in fact, be imitated artificially with considerable success.

The first group, that of the collagens or gelatins proper, includes not only food-stuffs like gelatin and isinglass, but those impure gelatins called glue and size, as well as the curious seaweed jellies, occasionally used as infant foods. For experimental purposes use an ounce or so of Nelson's gelatin, either the photographic or cooking varieties.

Pure gelatin like this is transparent, having neither colour, taste, nor smell. Heat some in a dry test-tube: it softens, though without actually liquefying, swells up, and gives off disagreeable gases resembling those got by burning feathers or hair. Gelatin keeps well in the dry state, but if moistened—and it is very hygroscopic—it begins to putrefy.

Put a pinch of gelatin into some water in a wide test-tube and observe the solution. This does not occur in the cold, but the gelatin swells up, absorbing from five to ten times its own weight of water, and thus becoming soft and jelly-like. When this is now heated up to 30° C., the water absorbed dissolves the gelatin to a clear solution, which, however, forms a solid jelly on cooling. Such a jelly is always formed whenever more than one per cent. of gelatin is present; if less than this be used, a hot solution remains liquid on cooling. As might be expected, a strong solution of gelatin gives a firmer jelly.

When a piece of butcher meat has been boiled for a long time, as in making soup, the connective tissue which serves as binding and packing material for the muscle

bundles is all gelatinised, as is also any gristle, ligament, elastic tissue, etc., so that gelatins of various kinds form the animal basis of all soups. To get gelatin from bones a stronger heat is required, demanding a high-pressure boiler; but the process is the same. Size is an impure gelatin made in this way, and glue is a coarse gelatin got by boiling hides, hoofs, horns, parchments, skins, tendons, etc.—in short, any kind of connective tissue. These are not used for food, but isinglass, a similar substance, enters largely into dishes as a stiffener or thickening agent. This is a collagen prepared from the "sound" or swimming-bladder of various fishes. The most valuable is that from the sturgeon, but more opaque varieties are got from cod, hake, and other fishes.

Certain seaweeds are fairly rich in jelly-forming substances, and of these the best known are *Chondrus crispus*, often called carrageen or Irish moss, the *Laminaria digitata* or dulse tangle, and agar-agar, an edible seaweed from the East Indies. This last is now very largely used in bacteriological work, being a very suitable nutrient medium for "cultures" of bacteria. The jellies obtained from the British seaweeds mentioned contain very little nitrogen, and resemble gelatin only in forming a jelly.

Gelatin is very readily digested, and hence is a favourite diet for invalids, from the dainty calf's-foot jelly down to the humbler cow-heel; but its nutritive value is low, being only about two-fifths that of ordinary albumen. Animals fed upon pure gelatin exclusively waste away, in spite of the high percentage of nitrogen which it contains; but when gelatins are administered along with other proteid food, a very marked increase of assimilation is shown. The proper function of gelatins in food would therefore seem to be regulating and facilitating the digestion of proteids: it is a mistake to rely upon gelatins alone for purposes of nutrition.

When a piece of fresh lean butcher meat is soaked in water, certain soluble matters are removed. These substances are called extractives, and they include some nitrogenous substances such as creatin, creatinin, xanthin and its allies, urea, taurin, inosinic acid, besides such non-nitrogenous substances as lactic acid, glycogen, inosite or muscle sugar, another fermentable sugar, and traces of formic, acetic, and butyric acids. Their total amount is very small, less than a half per cent. of the original weight of meat used.

In making beef-tea, which is a domestic meat extract, the main point to be noted is that albumen coagulates at 73° C. (180° F.), so that the temperature must never reach that limit. The hot water used will further dissolve out some fat as well as the inorganic salts contained in meat, and this will make up the total extract to possibly as much as 4 per cent.—in practice rarely 2 per cent.—the solids being thrown out. When it is remembered that a pound of lean meat is digestible to the extent of not less than 98 per cent., and that beef-tea made under the best conditions never contains more than 4 per cent. of meat solids, and those the least valuable for food, the sinful waste of the process becomes at once apparent. The public are, in fact, gulled by such phrases as "extract of meat," the "strength" of the meat, and so on, and this self-deception is fostered by the sweet uses of advertisement. In this, as in games, the trail of the capitalist is over it all.

The type of these extracts is Liebig's extractum carnis, to make one pound of which 34 pounds of lean meat are required. Liebig himself was under no delusion as to the true function of his preparation, and as far back as 1872 he wrote to the *Times* as follows:—"Neither tea nor extract of meat is nutriment in the ordinary sense.....It is surely a grave offence against all the laws of physiology to compare tea, coffee, and extract of meat with the more common articles of food." These preparations are, in short, nerve stimulants, and valuable as such; they encourage tissue-change, and so are useful in convalescence. The experiment has again and again been performed of taking a litter of puppies or pigs, dividing it into two groups, feeding one group on meat extracts, and the other on nothing at all. The second lot died of starvation, of course, *but the other lot died first*, in every case.

Many modern preparations, of which bovril may be taken as the type, seek to restore meat extracts to the position of a genuine food by adding solids derived from meat, such as muscle fibre, blood-albumen, gelatin, peptones, etc., but all such attempts have been comparative failures, for these solids have been greatly altered by the process used for their separation. If beef-tea is to be mixed with the solid meat from which it was made, why ever separate them, since by their separation the solids are rendered indigestible and the liquids non-nutritious? For a full discussion of this consult any good text-book on dietetics, or, from the chemical side, Allen's *Commercial Organic Analysis*, vol. iv.

The digestion of proteids forms a subject very suitable for class experiment. In the stomach these foods are converted into peptones by the action of a ferment, pepsin, acting in presence of hydrochloric acid, both present in gastric juice. Pepsin may be got from any druggist, either as powder or flakes, or as Benger's liquor pepticus, while the hydrochloric acid used is very dilute, only 0·2 per cent. Take three beakers or boiling-tubes, and into each put water and some of the white of a boiled egg. Into the first put a pinch of pepsin, into the second a little acid, and into the third both pepsin and acid. Put all three tubes into a large beaker with water, and keep at blood heat, say 38° C., for half an hour, then examine them. The results work out as under:—

Tube A.	Tube B.	Tube C.
Water, Albumen, Pepsin.	Water, Albumen, HCl.	Water, Albumen, Pepsin + HCl.
No change.	Albumen changed into acid albumen, but not dissolved.	Albumen changed into soluble peptone.

The stomach, however, is not the only or even the main seat of proteid digestion, and it is to the pancreatic juice that one must look for this in detail. This juice contains a ferment, trypsin, which also peptonises proteids, but in presence of an alkali: in artificial digestion use a 1 per cent. solution of carbonate of soda (soda-ash, not baking or washing soda) and Benger's liquor pancreaticus. Three beakers may be arranged as before: A containing water, albumen, and trypsin; B containing water, albumen, and soda; and C containing water, albumen, trypsin, and soda. After being kept at blood-heat for half an hour A shows no change, the albumen of B has been changed to alkali albumen but not dissolved, while that of C has been resolved into peptone.

In peptic digestion the pleasant odour and flavour of the natural food are destroyed, being replaced by the disagreeable odour of pepsin and a bitter taste due to by-products of digestion, so that for peptonising foods

pancreatic extract is used by preference. Full directions for peptonising are issued with the ferments sold; it will be sufficient here to describe the process in the case of milk. Dilute a pint of milk with a quarter of a pint of water, and heat to 60° C. Now add two to three teaspoonfuls of Benger's liquor pancreaticus, with ten to twenty grains of bicarbonate of soda, stirring thoroughly. Keep the mixture at 38° C. (blood-heat) for about two hours, then boil sharply for two or three minutes to arrest any further action of the ferment.

These predigested foods are, of course, useful in cases where the stomach and bowels are too feeble for their work, as in slow convalescence after stomach disorders; but they are to be used as crutches simply, to be discarded at the earliest opportunity. Dame Nature proceeds upon the principle that it is of no use to keep a dog and bark yourself.

NATURE NOTES FOR THE MONTH.

BY P. HORN.

FARMERS just now are having an anxious time, for they know by bitter experience that this is the critical month which decides whether the fruit crop is to be heavy or light. It may seem curious that the present weather conditions should have an effect on the supply of apples and plums, for we usually associate these articles of food with the autumn.

April is popularly supposed to be a month of warm sunshine and gentle showers. It generally is—at least in the earlier portion. Later on, when the fruit trees have been tempted to bring forth their flower buds, and the farmer is congratulating himself on the prospect of a good fruit year, the mercury in the thermometer suddenly drops to freezing point, and the wind veers round to the east. Down come the blossoms in showers—not only the petals, but the whole flower, including the seed-vessel, which we ultimately know as the fruit. On the following day the gentle rains descend in the more consolidated form of hail, to whip off any of the flowers that have been lucky enough to escape the effects of the frost. The fruit crop is irretrievably spoiled, and the unfortunate grower can only stand aghast and wonder how he will pay his winter rent when Michaelmas quarter-day comes round again.

This account may appear a trifle exaggerated, but it is exactly what took place in the Midlands last April. The year 1903 was one of the worst fruit years on record. A Buckinghamshire orchard eight acres in extent produced less than half a bushel of apples, whilst of pears and plums there was not the slightest trace. All this mischief was done in the space of two days (the 13th and 14th of April), just as the blooms were getting nicely set. Let us hope that the fruit grower will have better fortune this year.

An orchard of blossoming fruit trees is one of the prettiest sights imaginable, and the town dweller who usually takes his holidays in August, when the best of the season is over, will be agreeably surprised if he pays a visit to the country in April.

The apple-trees are simply one mass of pinkish blooms, whilst here and there a pear-tree provides a little variation, with its clusters of creamy white flowers. The whole picture is tastefully framed and set off by the delicate green of the enclosing hawthorn hedges, which are just beginning to burst into leaf. What a fine yield of fruit there would be if every member of the flower army was allowed to do its duty! In favourable years the sturdy boughs of the plum-trees have to be propped up, lest they be torn bodily from the parent trunk by the weight of their unwonted burden of fruit. Other thinning agents besides the frost are busily at work on the young buds. Certain destructive insects are in the habit of utilising them as cradles for the reception of their young larvæ.

Some of the birds undoubtedly do a great deal of damage, in spite of what people say to the contrary. One of the worst offenders in this respect is the bullfinch. A pair of these birds will perch in the top of a plum-tree, and nip off every bud within reach of their short, powerful bills. The scientist says they are really doing us a great service, by partaking only of the buds which contain the aforesaid noxious insects; but the gardener, who has his doubts about this theory, settles the argument with a shot-gun. Anybody who has watched the bullfinches at work will be inclined to agree with the gardener.

The Motherly Hedge.

The hawthorn hedges are now throwing out little bunches of tender green leaves from the bases of their sharp thorns. Later on in the year the leaves get coarse, and become toned down by wind and sun to a darker hue. Observant botanists have probably noticed what a great variety of plants may be found growing on the narrow strip of ground underlying the hedge. To those of an inquiring turn of mind the reason is obvious. When the autumn winds are distributing the seeds, a great number of the latter are driven in their flight against the impenetrable network of the hedge. Progress being arrested, they fall to the ground, their numbers being augmented from time to time by fresh arrivals. In the following spring quite a luxuriant growth of vegetation springs up round the borders of the fields, especially where two hedges meet at an angle. Farmers know to their cost that the funnel-shaped corners of the fields are apt to produce a rich crop of thistles, though few of them are aware of the reason.

Amongst the ordinary annuals beneath the hedge we find numbers of seedling trees in various stages of growth. These fortunate little plants stand a good chance of reaching maturity, for the thorny boughs of the overhanging hawthorn and brier effectually screen them against the attacks of their larger enemies. Under the present agricultural conditions very few of our native trees are permitted to establish themselves in the open. On the pasture lands the young seedlings are exposed to the teeth and hoofs of the grazing cattle. Later on the remaining plants share the fate of the surrounding vegetation, and fall beneath the scythe of the mower. The sole survivors of the numerous seedling army are those which had the good fortune to be planted beneath the shade of the motherly hedge.

Frog Culture for Amateurs.

A great many teachers annually endeavour to promote an interest in nature study by rearing tadpoles in the classroom. The experiment is not always a success, so perhaps the amateur frog-breeder may profit by the writer's experience.

The best receptacle in which to rear tadpoles is an aquarium, but failing this, an ordinary gold-fish bowl with a glass cover does not make a bad substitute.

The chief objections to the bowl are its liability to be broken, the distorted image produced by its convexity, and the small area of the ground surface. The latter difficulty can be easily overcome by filling the vessel a quarter of its height with well-washed gravel, or, better still, mud from the bottom of a clear pond.

If your pets are to thrive, it is absolutely necessary that they should have a supply of growing water-weed. The American pond-weed and the water-crowfoot are useful and ornamental, the latter plant bearing a number of pretty white flowers. Aquarium keepers often have a difficulty in getting their weed to grow properly, so perhaps the following brief hints will be acceptable :—

Choose plants which have a good show of young shoots for future growth ; if they have rootlets growing from the stem, so much the better.

Keep the aquarium covered, and standing in a place where a certain amount of direct light falls on it.

It is a mistake to wash the weed, however grimy it looks, for it often contains quite a surprising store of hidden treasures, in the form of leeches, snails, fresh-water shrimps, etc., which will prove as interesting as the young frogs. If any predaceous insects, such as the larvæ of Dytiscus, are found, put them in a separate vessel, or they will certainly create an impression in tadpole society. In a few days' time, if the above directions are carried out, the weed will adapt itself to its new conditions, and send up a vigorous growth of young shoots. The aquarium is now ready for the reception of the spawn.

The eggs of the frog take about three weeks to hatch, but the period varies according to the temperature of the surrounding water. Cold weather retards the growth of the embryo, and makes the date of hatching later than it otherwise would be, but it has no serious effect on the life within the egg. I once took some spawn from beneath the ice of a frozen pond in Richmond Park and put it in an aquarium out of curiosity to see what would happen. Some of the eggs turned light and unproductive, but a fair number of wrigglers were successfully hatched.

From the date of laying to the time of hatching the eggs undergo great changes, both in internal structure and outward shape, the latter change being plainly visible as an elongation of the black speck.

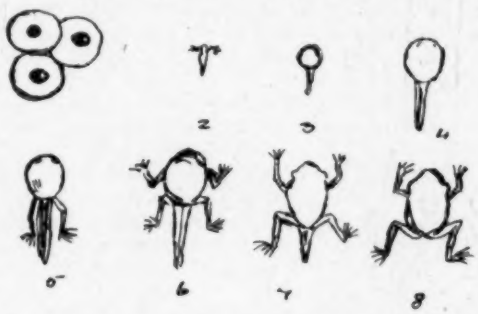
With the aid of a microscope it will be seen that the change in shape is due to the formation of the embryo, which lies on its side in a curved position. When the creature gains sufficient strength it breaks out of its prison and goes off to join the rest of its kin, who have attached themselves in crowds to the neighbouring weeds. In this state they can hardly be termed "tadpoles," for they are really still in the embryo stage. The digestive organs are rudimentary, eyes are absent, and the mouth is not sufficiently developed for feeding purposes. Within the body they still retain a supply of egg-yolk, and this nourishes them during their period of inactivity. The breathing apparatus consists of branching gills, which spring out in tufts at the sides of the upper part of the body. They are only retained in this form for a few days, ultimately becoming absorbed, to give place to a more complex set, hidden away in cavities at the side. By the time the egg-yolk is exhausted, the creature is furnished with eyes, and a horny beak suitable for tearing vegetable food. The tadpole is one of Nature's scavengers, an omnivorous feeder, who keeps our ponds clean by eating the refuse animal and vegetable matter.

In a state of captivity they will thrive to a certain extent on a vegetable diet, but if not supplied with animal food they are apt to make a meal off their weaker brethren. A convenient method of feeding is to tie a piece of meat to the end of a string, and lower it gently until it rests on the bottom of the aquarium. The succulent morsel soon becomes the centre of attraction to an eager crowd of diners, who, with heads to centre, jostle and push each other after the manner of foot-ballers participating in a "scrum." Any food remaining should be carefully taken out before it has a chance of going bad, otherwise it will taint the water and cause objectionable smells to arise.

Tadpoles will stand a lot of neglect, but if a regular food supply is not forthcoming they are apt to linger in the tadpole stage long after their fortunate brethren of the ponds have completed their metamorphoses. A September tadpole may be unique, but it is no credit to its possessor.

The first sign of approaching froghood is shown by the budding hind legs. From mere useless appendages they gradually increase in size, until they are capable of assisting the tail in its work of propulsion.

The front legs develop more rapidly than the hind ones, and their coming is accompanied by a corresponding change in the body. The plump form shrinks and becomes angular in places, the eyes get prominent, the



mouth enlarges, and the whole aspect begins to look decidedly froggy.

The internal changes are still more important. Lungs are developing at the expense of the gills, so that the creature has to be continually popping up, newt fashion, to the surface of the water. A skeleton forms, and the digestive organs are modified to suit a creature of purely carnivorous habits. Finally the tail, which does *not* drop off, is absorbed little by little, to assist in building up the growing body.

Our friend, now a perfectly formed batrachian, seems anxious to quit the scenes of his youth. Take him out, if you wish to preserve his life, or his less advanced companions will assuredly be found feasting on his remains in the morning. Put your young frog into a gold-fish bowl, with a piece of damp turf, and keep him well supplied with small *living* insects, preferably the green fly or aphis, which can be brushed in hundreds from the rose bushes.

How to Mount a Descriptive Series.

In order to preserve some record of the frog's interesting career, it is advisable to mount a few specimens in various stages of development. The above rough-and-ready diagram is intended to give some idea of what a comprehensive set should look like. No. 2 is the

newly-hatched animal; the rest are easily recognised. When your victims reach the stages shown in the diagram, drop them into the solution, as recommended last month. It may seem cruel, but it is the only way of killing them without injuring their delicate bodies. Get an ordinary gas jar with a top, and procure a sheet of white opal glass just wide enough to stand in the interior. Lay the specimens on a sheet of blotting-paper to drain off superfluous moisture, and fill the jar with a preservative solution made up of 95 per cent. water and 5 per cent. formaldehyde.

A fairly good medium for affixing the tadpoles is made by heating gelatin, which has been soaking in water for a few hours previously. Place a drop of the hot liquid on the opal glass in the required spot, and quickly lay the specimen on, before the gelatin has had time to cool. When the whole series has been mounted, one above the other, lay the glass aside for an hour, in a horizontal position, so that the medium may set firm. When all is ready, slide the glass gently into the jar, and seal on the cover with a smear of vaseline.

We have now a useful little series, which may prove invaluable later on, when the living specimens are hard to procure.

The Swallow's Return.

The bulk of the migrants arrive here this month, and everybody welcomes them as forerunners of a pleasant season.

There is an old saying which implies that the solitary swallow does not make a summer. This proverb could be applied with equal justice to the wheatear and chiff-chaff, who often beat the swallow in the race for home. Doubtless the latter bird was chosen because he has always been so easily observed, owing to his immemorial habit of frequenting the dwellings of mankind. The little chiff-chaff escapes general notice by keeping to the shelter of the trees, so nobody has thought fit to immortalise him in a proverb.

On watching the habits of our summer visitors, we find that a great number of them are insect-eaters pure and simple. This is probably one of the reasons why they left us last autumn, for birds like the swallow and fly-catcher could hardly find a living if they stayed here all the winter.

An examination of the contents of an insect-eater's stomach affords an interesting little occupation for the entomologist. Amongst the black semi-digested mass a number of shining objects will be noticed. They are the wing-cases of minute beetles.

Further examination reveals the presence of numerous legs, in such a good state of preservation that the painstaking naturalist, aided by a microscope, can identify the class to which the unfortunate owners belonged.

Amongst the ranks of the migrants are to be found many of our best songsters. The nightingale holds the first position, followed closely by the blackcap, garden warbler, and tree-pipit.

In the intervals between their songs our visitors are busily employed in keeping down the insect pests; so, taking all things into consideration, we see that they are a very useful company indeed.

We have received a specimen of Hardtmuth's Koh-i-Noor pencils, together with a delightfully illustrated booklet. We were already familiar with the excellent make of the pencils, and have them in constant use; but we were charmed with the beautiful specimens of colour printing in the booklet, which will be sent free to any of our readers who apply to Messrs. Hardtmuth.

NOTES OF LESSONS ON LEAVES.

Class.—The lessons are intended for Standards IV. and V., and are suitable for urban as well as for rural schools.

Time.—The lessons themselves would take about two hours, and might be divided into two of an hour each, or three of forty minutes each. This, however, does not include the time spent in the preparation.

Step I. Preparation.—(*a*) Every schoolroom should contain a few growing plants to enable the children to watch their gradual development.

(*b*) One of these might be kept in a dark corner for a time, in order to show that light is essential to plant life.

(*c*) Mustard and cress could be grown on flannel or hyacinths in glasses of water.

(*d*) Without encroaching in the least on the time of the drawing lessons, these may render invaluable aid in the preparation of this or similar lessons in nature study. Leaf-forms can be used as drawing copies in these standards. At first these should be drawn by the teacher on the blackboard and the children allowed to copy them, paying particular attention to (*a*) the general shape, (*b*) the edges, (*c*) the venation. Afterwards they should be allowed to draw straight from the actual leaves themselves.

Step II. Presentation.—1. *Position of leaves on stem.*—Although at first sight the leaves seem to be scattered indiscriminately over the tree, a slight examination suffices to show that this is not so, but that the leaves are placed on the stem in a perfectly regular manner. The arrangement differs in different trees, but it is always alike in trees of the same kind. Twigs of various trees should be examined before the class, and the children should be encouraged to extend their observations for themselves. The chief modes of arrangement are:—

(*a*) *Opposite*, as in the maple and horse-chestnut.

(*b*) *Alternate*, as in the elm and birch.

(*c*) Alternately opposite pairs (*decussate*), as in the dead-nettle. Here each pair springs from the stem at right angles to the preceding one.

(*d*) *Spiral.* Sometimes the leaves will form a spiral round the stem, as in the aspen and the oak. In the former, four leaves go to each revolution of the spiral; in the latter, six.

(*e*) *Whorled*, as in the common loosestrife. Here several leaves spring from the same point.

2. *The Shape of Leaves.*—In classifying leaves according to their forms, we take the general shape, omitting all indentations and notches. The simplest method of getting the shape is to lay the leaf on a piece of paper and draw a line round the outside from point to point.

The following are the most common shapes, with a typical example of each—but this list should be extended by the children themselves as a result of their own observation: the sycamore leaf is heart-shaped; the oak leaf is oblong; the leaves of the elm, the beech, and apple are oval; the maple leaf is kidney-shaped, the leaf of the wallflower is spear-shaped, and that of the convolvulus is like an arrow-head.

3. *The Edges.*—Having considered the general shape, next examine the edges carefully. Here, again, we find almost as many variations as in the shape. The edges may be smooth, as in the wallflower and the lilac; saw-like, as in the sweet-chestnut and the dead-nettle; or the teeth may be again subdivided, making, as it were, a double-saw, as in the birch and elm. Sometimes the edge has a number of curves, as in the ground ivy; or lobes, as in the oak and the sycamore; and sometimes

HEART SHAPE.

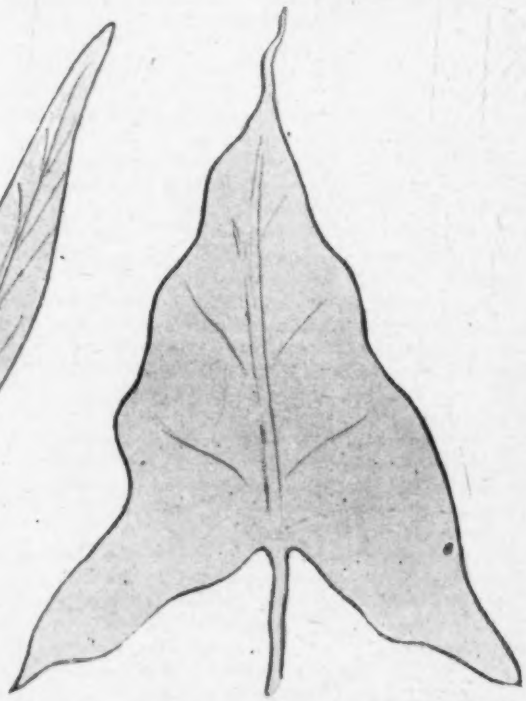
the veins radiate from a point near the base of the leaf. Notice in every case how this arrangement enables the veins to carry out the twofold use of supporting and conveying nourishment to every part of the leaf.

5. *The Use of Leaves.*—Place a bunch of fresh watercress in a basin of water in which carbonic acid gas has been dissolved, and cover them with an inverted funnel, over the small end of which is placed a test-tube full of water. If the basin is placed in bright sunshine, where the light can fall upon the leaves, small bubbles of gas will be noticed rising from the leaves. These bubbles will collect in the test-tube, and if sufficient time be allowed, enough gas will be collected to demonstrate its nature with a glowing splint, and thus prove it to be oxygen. Arrange another bunch of leaves in precisely the same way, but let these be kept in a dark place. In this case it will be found that no oxygen has been collected.

The first experiment illustrates in a most striking manner the use of the leaf. All plants require carbon to build up their frames, and this is obtained by the leaves from the carbonic acid gas in the air. The second experiment shows that it is only in the sunlight that the leaves are able to break up the carbonic acid gas in order to retain the carbon, thus setting free the oxygen.

OVAL SHAPE.

LANCE SHAPE.



ARROW-LIKE SHAPE.

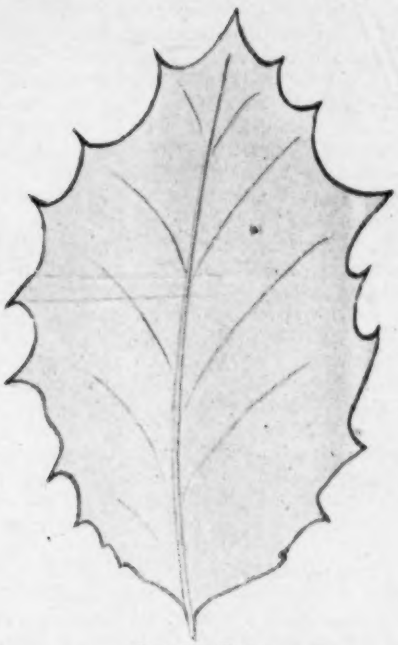
the edge is armed with long and sharp spines, as in the holly.

4. *The Venation.*—The next point to notice in our leaves is the arrangement of the veins. If the leaf is long and narrow, like the leaf of the daffodil, plantain, or lily of the valley, then the large veins will run almost parallel to one another. In most leaves, however, there is one large vein in the centre, called the "midrib," from which the others branch off; but in some cases, as the ivy,

Now let the children note and compare the difference between the two plants that have been growing in the schoolroom, the one in the sunshine and the other in the dark.

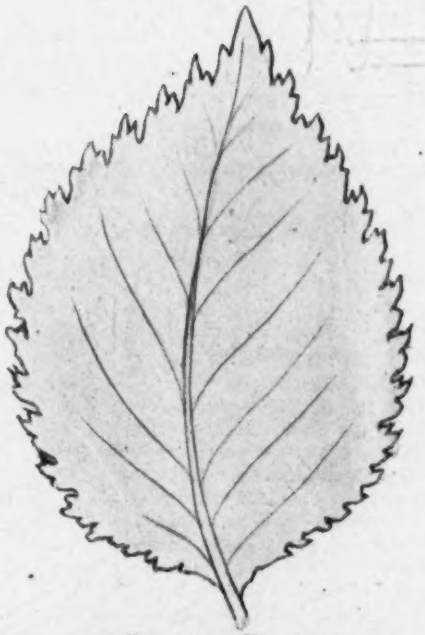
The fact that the plant depends on its leaves and not on its roots for its supply of carbon for building its structure is clearly proved by the mustard and cress that have been grown on flannel, and the hyacinth grown in a glass of water. Here the roots can obtain nothing but water,

LOBE EDGE.



PRICKLY EDGE.

SAWLIKE EDGE.



DOUBLE-SAW EDGE.

so all other nourishment must be supplied by the leaves.

Step III. Association.—The extent to which this step is carried in regard to the shape, edges, and venation of the leaves, will depend largely on the curriculum of the school and the time at the disposal of the teacher. If the lessons are intended simply to interest the children in nature and her handiworks, then only those terms which are self-explanatory should be employed; but if botany is taken as a class subject, then the proper botanical classification could easily be taught in this step, since in nearly every case where the nomenclature is not self-explanatory, it is obtained by the association of ideas—for example, lanceolate (like a lance,) cordate (heart-shaped), hastate (spearlike), etc.

In dealing with the veins, these should be compared to the veins in the human body, and the fact clearly brought out that, while both perform the function of supplying nutriment to the various parts, the veins of the leaf act also as a skeleton in giving support, just as the bones of the human body do.

The action of the leaves, too, in breaking up carbonic

acid gas should be contrasted with the change that takes place in the lungs during respiration, showing that, while animals consume oxygen and breathe out carbonic acid gas, the plants counterbalance this by breaking up this gas, retaining the carbon and restoring the oxygen to the atmosphere, thus assisting largely to purify it during the daytime, although respiration, as in the lungs, is also carried on in plants in a minor degree. Children should now understand why plants should not be allowed in bedrooms.

Step IV. Formulation.—*Position of leaves on the stem.*—The leaves may be opposite, alternate, pairs alternately opposite (decussate), spiral, or whorled.

Shape of Leaves.—Heart-shaped, oblong, oval, kidney-shaped, spear-shaped, arrow-shaped.

Edges of Leaves.—These may be smooth, sawlike, curved, or prickly.

The Veins.—These serve to support the leaf and to supply it with nourishment.

Use of the Leaves.—The leaves supply the plant with carbon, which they are able to obtain in the presence of sunlight by decomposing carbonic acid gas. In this way they counterbalance the effect of animal life on the atmosphere.

Step V. Application.—1. One important practical application of these lessons will be the collecting, arranging, and preserving of leaves by the children.

2. If drawing is taken, then a knowledge of the various leaf forms will be very valuable in drawing floral ornaments on plant life.

3. Children in towns and cities should do what they can to protect the few trees they have, since they not only serve to beautify the streets, but also to purify the atmosphere.

THE INSPECTOR'S NOTEBOOK.

BY AN INSPECTOR OF SCHOOLS.

The "Notebook" Query Column.

All communications to be addressed "Inspector," care of Editor, 33 Paternoster Row, E.C. None but very urgent requests will be dealt with by letter. Two stamps for such replies should be enclosed.

J. W. is a certificated teacher who has entered a secondary school. He asks, "What is my position in relation to the Superannuation Act now? 1. Will the authorities refund the money I have paid? 2. Can I continue subscribing £3 annually, and benefit, supposing I never re-enter an elementary school? 3. If I continue subscribing and re-enter an elementary school after a few years' interval, what is my position as regards superannuation? 4. Am I at liberty to withdraw from my acceptance of the Act?"

Answer.—In order to be eligible for the benefits of the Act you must serve in "recorded service."

"It should be clearly understood that no return of any kind can be made for a teacher's contributions unless he lives to the age of 65 years. The only return which can then be made is the annuity due to himself. Under no circumstances whatever can the teacher or his relations have the contributions or any part of them returned in a lump sum. On the other hand, however few or broken a teacher's contributions may have been, the annuity to which they entitle him will be payable upon his reaching the prescribed age, whether he is then in service or not."

1. No. 2. You cannot subscribe, except for six months' interval, whilst not serving in "recorded service." Secondary teaching is not "recorded service." 3. Your position would be that your past contributions would count. 4. If you withdraw officially, you would, I expect, lose all benefits. You are advised not to do this.

P. M. C. has just completed his apprenticeship, and is awaiting the result of the K.S. Examination. He has been ill for seven days, and his Board has asked him to resign. He asks the position of the Board in the matter.

Answer.—The Board should give him one month's notice. They are under no obligation to continue his services until the result of the K.S. Examination is made known. He need not be disheartened. The market is brisk. He will have no difficulty in procuring an equally good if not better situation.

Reada.—Thank you for the additional information you give me. By the way, your full name should have been sent. You are rather old to go through a training college. I should say your best course is to offer your services *gratis* for six months as an Article 68 at some good infant school, and meanwhile study for either the Froebel Certificate or the Aberdeen University Women's Certificate. For information respecting the former write to the Secretary, National Froebel Union, 4 Bloomsbury Square, London, W.C., and enclose three stamps. The Registrar, The University, Aberdeen, will supply information about the latter.

A. M. J. has written me for advice respecting study for a degree. She has spent three years at a training college. In her third year, whilst preparing for the Inter. Arts, London, her health gave way. She desires to get into secondary work. Her favourite subjects are history, literature, and mental science.

Answer.—Your letter was too late for a reply last month. We go to press early in the month preceding issue.

Health is the keystone of life. On no account so study as to sacrifice that. Consult a doctor before settling down to B.A. work. In any case be satisfied with a "pass." Honours are not worth the necessary sacrifice to a private student like yourself. Your favourite subjects certainly are more suited to a secondary school, but you *must* stay in a primary school until you have got your parchment.

Inquirer asks where she may procure a copy of the L.L.A. syllabus.

Answer.—Write to the Registrar, St. Andrews University.

Meriden asks what value is set upon the Cambridge Senior Certificate in primary schools. She wishes to take up infant teaching.

Answer.—Provided that English is included among the groups in which the candidate has passed, the examination you name qualifies under Article 51 (*b*) of the Code. Those so qualified can be employed as assistant teachers, and receive from £45 to £60 per annum.

N. S. writes for advice as to what steps to take to qualify for the post of sub-inspector of schools under the Board of Education, or inspector under a local education authority. He has nearly completed his degree at the Welsh University, and is twenty-three years of age.

Answer.—Complete your degree, and then try to get as much experience as you can in the various branches of educational work. In about two years try to procure an assistant secretaryship or assistant inspectorship.

You will then be in the running for a full secretaryship. No more sub-inspectors under the Board of Education are to be appointed. There are now junior inspectorships instead. Write for regulations to the Secretary, Board of Education, Whitehall, S.W. These posts are difficult to get, and are being obtained by men with university distinctions.

R. E. L. intends sitting for the Certificate Examination this year, and would then like one year's training. Can he enter a college this September? Which colleges take Nonconformists?

Answer.—You could not start your year in college until 1905. You could apply to Birmingham University, Southampton Hartley College, Reading University College, Oxford or Cambridge University, London King's College, London University, or Bangor.

E. W. is a trained certificated teacher, has matriculated, and is reading for B.Sc. He asks whether it is advisable to apply for a course at the Royal College of Science, or to complete the B.Sc. by attending evening classes.

Answer.—My correspondents who require advice on personal matters should supply me with full information about themselves. My answer to E. W., for instance, cannot be of much use unless I know his age and circumstances. A course at the Royal College of Science, if he is young and can afford it, would be invaluable. The B.Sc. would be worth much more to him if he could show two years' training at the R.C.S. If E. W. will write me more fully I will further advise him.

E. S. writes: "Could you kindly advise me as to a book of suitable occupations, games, etc., for an upper school to improve the Friday p.m. attendance?"

Answer.—I know of no book quite on the lines you wish. Try brush drawing, freearm drawing, a general knowledge lesson, or nature-study walk. Does any reader know of such a book? If so, will he kindly send the name to me?

CONCENTRIC METHODS IN HISTORY.

BY ROBERT BUNTING.

EDUCATIONAL ideals and processes are as truly the result of evolution as is the production of a species in the animal world. The same laws have the same effect. Time, place, or circumstance aid or delay, and progress moves unequally.

Confined to the few, education meant knowledge. Knowledge was synonymous with power. Power was the privilege of the aristocratic and clerical classes. Therefore the common people were kept ignorant.

A change came at last. The giant began to feel his strength. The people, who had been kept under, began to be in the ascendant. They saw the source of their former masters' strength, and they determined to possess a share of those advantages which had been kept from them. The desire for education grew. Schools multiplied and began to fill the land. Knowledge was the goal in view, and in the effort to obtain it many mistakes were made. At first the acquisition of information through the teacher was thought to be the essential. All children were treated alike; the weak and the strong, the bright, intelligent child and the mentally inactive one, all had to be pressed into the same mould. Individual development was lost to sight. And so it continued. Information first, mechanical reading and mechanical writing as accessories. Then came the Code of 1870, which, with its system of payment by results, stereotyped that policy of cram which Dickens so cleverly satirised in *Hard Times*. Later came greater freedom, and with the freedom, greater responsibility, more rapid evolution.

The influence of the English and continental thinkers began to have direct effect upon our methods. To-day in the best schools there is an earnest attempt to make education what it should be—not a mere conglomeration of unrelated facts, but a mental and physical training that shall send our youth out into the battle of life bright and intelligent, prepared to face and overcome the difficulties that may meet them. This is as it should be. This is the type of individual which the nation wants; and he will increase in number unless we are driven back again into the pernicious atmosphere of cram, which some authorities seem only too anxious to restore.

Could we have the child under our care from the time of the first beginnings of his mental development till the period when he launches himself into his life-work, it might be possible to work out an ideal scheme of education that should give all that is required. But the time is limited to a maximum of six hours per day in the school, and the necessary subjects are many: it is an open question whether they are not too many; but the circumstances that surround school-life make the demand, and the demand has to be met.

How, then, can we get the greatest benefit from our labours? Arithmetic takes up a large share of the time, a disadvantage that a decimal system would largely remove, while such subjects as geography and history are liable to be thrust into the background. But these subjects in their way are as important as mathematics. When properly taught, they act in the opposite direction to the mathematical subjects, which have a narrowing personal influence. Geography and history, especially the latter, have a broadening, patriotic influence, training the imagination rather than the memory, carrying the mind outside the present into time and space.

If their real value is to be secured, they must be taught properly. For too long these subjects have been looked upon as nothing better than mere accumulations of fact. Lists of towns, of rivers, mountains, seas, and lakes; lists of kings, dates, battles, and Bills, but never the human connecting link that made them something more than a collection of the driest of dry bones. Most of us look back with sorrow as we remember the painful efforts to memorise long strings of places, events, and dates—facts that long since have slipped away into the lumber-room of forgetfulness. Here and there a fragment remains associated with some clinging rhyme in the vilest of doggerel verse.

We recognise now that this is not the way to teach imaginative subjects. Geography must be something real. It must have some definite relation to us ourselves; it must be the relation between cause and effect, and the relation must be one that we can ourselves discover and rediscover as often as we need. So also with history. We are "heirs of all the ages," and we should know our heritage, even though

> "The great world spins for ever down the ringing grooves of change."

The assembling of unrelated data is absolutely worthless. There must be the closest of relation in all that we do; there must be the atmosphere of reality; there

must be the fire of enthusiasm. And there is no method of teaching history and geography better than that which is known as the Concentric System. The name is not perhaps the best that might be chosen. It suggests a greater limitation than it takes in practice, but it is sufficiently descriptive to be serviceable.

How could such a system be worked, say in the subject of history? The following details may be of service to some teachers who would like to prepare their work on intelligent lines. It is impossible to give a full syllabus, as schools vary so considerably in their constitution. Moreover, many districts have a clearly-marked local history, intimately related to the general history, and this ought to occupy a prominent place in any scheme.

First, then, it should be laid down at what point in the school course definite related historical matter should begin. In a large school with upper forms, or standards, the Fourth or Fifth Standard will be a convenient starting-place. Previous to this point, the history course should consist of stories of persons, places, or things, told by the teacher with as much picturesqueness as possible. Fairy stories, folklore, all that children love, grotesque, highly-coloured, exaggerated even, so long as their imagination is fired. The proper perspective will come with later experience if the teacher teaches wisely. As Dr. H. J. Mackinder said in a recent lecture: "Premature accuracy is bad. It is unnatural, and we must be content to arrive at precision gradually."

But, about the Fourth Standard, history proper may begin. The teacher may think it advisable to so plan his work that he covers the whole ground lightly in his first year's course. In this case he would lay his work out in, say, the following periods:—

1. The Roman, Saxon, and Danish times.
2. The Norman and Baronial period.
3. The Stuart and Cromwellian.
4. More recent events.

In the next year's course each of these would be extended: for example, whereas the work of the first year would be *general*, dealing with broad features, that of the second year would necessarily be more detailed. Thus:—

1. The character of the Roman occupation and the chief events in the lives of some of the Saxon and Danish kings would be added to the first year's course.

2. The influence of the Normans in the time of Edward the Confessor. Greater details of William the First's reign, and the character of the Crusades.

3. An account of the Armada. Drake and Hawkins. James's claim to the throne. The outlines of the Civil War. The Protectorate, and the return of the Monarchy.

4. Stories of Wolfe, Nelson, the Indian Mutiny. Steam-engine.

There should now be no difficulty in expanding such a syllabus to suit a third year's course. The formation of the Saxon kingdoms, the decay of the feudal system, the progress of discovery and the rise of sea-power, the right of the people to select the sovereign and the commercial greatness of the nation, would fall into place naturally as the lines of extension.

In the fourth year some definite period might be systematically studied, preferably one of the more recent—the Stuart or the Hanoverian. This fourfold repetition of the original outline of the scheme would ensure, by the end of the last term, a wide and real acquaintance with the national history.

There is, however, an alternative method of proceeding that hardly comes within the term concentric, but yet for convenience may be included. It might, perhaps, be more suitably designated as the parallel method. Each year's work in this scheme would be complete in itself, and would cover the whole extent of English history, the amount of detail introduced depending entirely upon the time that could be devoted to the subject. The second and subsequent year's work, although having a different object, would yet traverse the same ground, and bring a new light upon the facts already acquired. The advantage of such a system is obvious. The work is always complete at the end of each course; the whole of the historical period has been reviewed; the modern conditions or facts are as well known as the ancient.

For such a scheme of work the following heads may be suggested.

First Year (pupils about 11).—A general notion of the social conditions of the people.

Second Year.—(*a*) Great Britain as the greatest sea power; or (*b*) the growth of our commercial supremacy.

Third Year.—The British Constitution.

Fourth Year.—Study of special periods of British history.

It will readily be seen how each of these courses will be assisted by and will revise those before or after them. Much of the material in one must necessarily be used in the other, either as a base of study or as illustration. In detail, the first year's course could be arranged on something like the following lines:—

1. People.

Some interesting facts concerning the appearance, habits, or coming of the early Celts, Scotch, and Irish, the Romans, Saxons, Danes, Normans, and Flemish.

2. Conditions of Life at Various Periods.

(*a*) Among the aristocracy—Thanes, barons, and well-to-do classes.
(*b*) Among the lower classes—Ceorls, theows (villeins), socmen, labourers, operatives.
(*c*) Military service under feudal system—Militia, army, volunteers.
(*d*) Life in the towns. Freemen, charters, etc.
(*e*) Housing and sanitary conditions.
(*f*) Plagues and fires.
(*g*) Distress after great wars.

3. Various Details of Government.

(*a*) The tything (frankpledge). Moots. Reeves.
(*b*) The Witan and Great Council.
(*c*) Trial by ordeal, combat, jury, judge.
(*d*) Parliament.
(*e*) Borough and parish councils.

4. The Religious Bodies.

(*a*) In the towns. } Their value as centres of learning
(*b*) In outlying districts. } and peaceful arts, as well as giving relief to the necessitous.
(*c*) Their suppression, and the growth of the Poor Law administration.
(*d*) Sanctuary.

5. Rebellions—their Causes and Results.

(*a*) Bridal of Norwich.
(*b*) Simnel, Cade, Tyler, and Pilgrimage of Grace.
(*c*) Ket, Gordon Riots, Rebecca's Daughters, Luddites, Chartists.
(*d*) The French Revolution and its echo in England.

6. Trade and Progress.
(*a*) Agriculture round the castles.
(*b*) Statute of Labourers.
(*c*) The wool industry.
(*d*) Monopolies and free trade. South Sea and other companies.
(*e*) Fairs.
(*f*) Banks, railways, and penny postage.

7. The National Expenses.
(*a*) Military service.
(*b*) Taxes on produce (wool and corn).
(*c*) Special taxes for war purposes.
(*d*) Wealth of monasteries into royal coffers.
(*e*) "Morton's fork."
(*f*) Purveyance and ship-money.
(*g*) The national debt.
(*h*) High duties and smuggling.

Although having a distinct character, all the above sections overlap in parts, so that where a class took the whole course as arranged there would be a constant picking up of or return to familiar surroundings. Each section would give opportunities of throwing a fresh light on the others. The time required to take the whole course depends largely on the amount of detail put into the lessons, but there is no reason why fewer sections should not be selected to form the course. Sections 6 and 7 might be transferred to a second year's work in connection with the "Growth of commercial supremacy." No argument is required to show the value of such a course as that given above. It provides an inquiry into the daily life of the people—a subject that even children can understand and appreciate.

Suggestions for second year's course:—

The British Naval Supremacy.

From the simple fact of her geographical position Britain has been compelled from the first to turn her attention to the sea, either as a source of food or as a commercial highway. Further than this, her great natural resources, both mineral and agricultural, coupled with proximity to the Continent, have made the possession of these riches a thing to be desired. Hence from the earliest periods of written history she has had to be prepared to defend her coasts. With the growth of civilisation greater facilities both for attack and defence have been provided. Minor engagements between opposing forces were doubtless of constant occurrence. Concerning most of these history is silent. But now and again the nation had to rise to the occasion, to put forth all her might and conquer or be conquered. Even though there were times when the victory was not with her, yet her failures were never crushing, and during the quiet periods she was by peaceful methods gradually acquiring strength.

The subjoined syllabus considers all the periods, and opportunity is given for definite historical teaching throughout the course.

1. Comparisons dealing with the Growth in Form and Character of Ships.
(*a*) Very early forms, "dug-outs," hollowed by fire and rude implements. Coracles made of basket-work covered with skin.
(*b*) Greek and Roman galleys and ships.
(*c*) The Viking ships of the Saxon and Danish periods.
(*d*) The increasing use of sail power. Norman. Columbus's ships. Drake's ship. Ships of the Armada. Nelson's *Victory*.
(*e*) The modern steamboat—paddle-wheel, screw, and turbine types.
(*f*) Change in offensive power: at first only for transport; at a later period gun-carrying. Three-deckers. Modern warships of all classes, including the submarine.

2. Ships as Transports.
(*a*) The manner of coming of the Romans, Saxons, and Danes, and measures taken to oppose them.
(*b*) Scutage, giving the king funds out of which he could hire ships and men, so beginning the breakdown of the feudal system.
(*c*) The Crusades and the capture of Cyprus.
(*d*) War with France, 1415.

3. Ships as Trading Vessels.
(*a*) The great trading nations—Venice, Flanders, Portugal, England, and Holland.
(*b*) Voyages of discovery, promoted by the action of Turkish merchants securing the trade of the East. Columbus to the West Indies. Cabot with Bristol ships and men to the mainland of America. De Gama and India.
(*c*) The sea rovers—Drake, Hawkins, Frobisher, and others.
(*d*) The East India and South Sea Companies.

4. Decisive Sea Fights.
(*a*) Battle of Sluys, 1340.
(*b*) The Armada, 1588.
(*c*) La Hogue, 1642.
(*d*) Gibraltar (Story of), 1704.
(*e*) St. Vincent and Camperdown.
(*f*) Nile, Copenhagen, and Trafalgar.

A simple outline of the circumstances leading up to the above battles, with the result of the victories, will necessarily form a part of the course.

5. Modern Conditions of Naval Warfare.
(*a*) The necessity for retaining the command of the sea, compared with the conditions in (1) Norman, (2) Tudor, (3) Cromwellian, and Georgian times.
(*b*) The various types of warships and merchantmen.

Suggestions for the third year's course:—

The Growth of the British Constitution.

1. General Notions.
(*a*) Causes which lead to the settlement of peoples in groups. The family, the tribe, the hamlet, village, and town.
(*b*) Necessity for laws—the common benefit, protection within and without, with the appointment of special officers to see that justice is done to all. The patriarch. The chief, the king, together with subordinate officers for executive purposes. Magistrates, police, etc.
(*c*) Sharing the cost. Gifts, levies, rates, and taxes. National debt.

2. Forms of Government and the Making of Laws.
(*a*) The Witanagemot, with subordinate officers of shire-moot, the town reeve, the hundred moot, etc.
(*b*) The king and Great Council. Curia Regia.
(*c*) The Great Council and the beginnings of Parliament.
(*d*) The king becoming absolute (Henry the Seventh to Charles the First).
(*e*) Government by the army (Revolution).
(*f*) The nation absolute. Government by Parliament. King, Lords, and Commons.

3. Important Events in the Growth of the Constitution.

(*a*) The authority of the Bretwaldas and of Egbert.
(*b*) Harold chosen by the Witan.
(*c*) The introduction of the feudal authority and its resistance by the barons, culminating in Magna Carta.
(*d*) Henry the First's charter, and struggle with the Church.
(*e*) Henry the Second controls the barons.
(*f*) The Provisions of Oxford.
(*g*) Representatives of all sections meet in 1265 (the first Parliament). The Model Parliament, 1295.
(*h*) Clergy contribute to the revenue, 1296.
(*i*) Confirmation of the charters.
(*j*) The Lords Ordainers, 1310.
(*k*) The commons take a part in legislation, 1322.
(*l*) The two Houses of Parliament.
(*m*) The Wars of the Roses finally destroy the baronial and feudal power.
(*n*) Henry the Seventh becomes king by Parliamentary consent.
(*o*) Tudor kings nearly absolute.
(*p*) The Divine Right and Petition of Right.
(*q*) The king overthrown (Cromwell and the army).
(*r*) The Habeas Corpus Act and Declaration of Right.
(*s*) The Parliament gives the crown and regulates the succession.
(*t*) One, Three, and Seven Year Parliaments.
(*u*) Union of England with Wales, Scotland, and Ireland.

PRACTICAL HELP IN THE ARITHMETIC LESSON.

BY GEORGE COLLAR, B.A., B.SC.,
Joint Author of "A New Arithmetic."

MISTAKEN notions on the nature of "compound" rules are very common, and the teacher should carefully explain to his class what is meant by "compound" expressions and "compound" sums. The confusion perhaps arises from the frequent use of the terms "money sums" and "weights and measures" to denote "compound sums," quite regardless of the fact that sums involving money or weights or measures may after all be *simple* sums. If an expression involves only units of one order, it is a *simple* expression, and operations on such expressions come in "simple rules." Thus 27 cwt., 27d., 27 oz., are simple expressions, and the operations of addition, subtraction, multiplication, and division performed on such expressions are "simple." But the expressions 1 ton 7 cwt., 2s. 3d., 1 lb. 11 oz., although respectively equal to them, are "compound" expressions. Hence it follows that "money sums" may be taught among the simple rules, provided that in each example only one unit is employed. This of course is in keeping with the rule that the work should be presented to the children in a concrete form. Again, there seems no advantage in separating "money sums" from "weights and measures." The four fundamental operations may be taken in order, and examples in weights and measures given with examples in "money." It is advisable not to bother children with obsolete tables and those that are rarely used, such as apothecaries' weight. Again, the examples should have some relation to practical applications; and in practice we never use more than three units, and seldom more than two. If a distance is long enough to be estimated in miles, we never trouble about odd inches; and we do not consider ounces of coal or other things which we measure by the ton. Arithmetic books are obliged to allow for the vagaries of examiners, hence such sums are to be found occasionally in books. Remember that in long measure, yards and perches are seldom or never used together; the "rod, pole, or perch" is used as a subdivision of the mile or furlong, not as a multiple of the yard. When surveyors want a multiple of the yard they use the chain, which is equal to 22 yards.

It is advisable not to arrange for a full course of "reduction," either at the beginning or at the end of the other rules, but to teach the principles of reduction first, and from time to time work in examples of increasing difficulty. No point in the whole of arithmetic is so important as the realisation of the nature of a "unit" as a fixed quantity used in the measurement of other quantities, and of a "number" as that which shows how many times the unit is contained in a given quantity. Reduction offers a special opportunity for driving this home, because the same quantity may be represented in several ways according to the unit we select. Thus 4 yds., 12 ft., and 144 inches all represent the same length, and the children must be taught to recognise that the smaller the unit the greater will be the number of them required—for example, since a foot is only one-third of a yard, there will be three times as many of them in the same length. If this fact is insisted upon, there will be no difficulty in preventing the children from saying such silly things as, Multiply £12 by 20 to bring them to shillings. If £12 be multiplied by 20 the result is £240, not 240s. The correct reasoning is as follows:—A shilling is a twentieth of a pound, so there will be 20 times as many of them in the same sum. $12 \times 20 = 240$, which is the *number* of shillings.

There is very little to be said in favour of memorising pence and shillings tables, and no corresponding tables are attempted in weights and measures. The multiplication tables by 12, 20, and 16 should be made thoroughly familiar, and abundant practice should be given in converting pence into shillings, inches into feet, shillings into pounds, hundredweights into tons, ounces into pounds, etc., and *vice versâ*, by simple multiplication and division.

A point that is generally neglected in reduction is the advantage of combining steps when there are no intermediate units to be added in: thus hundredweights need not be brought to quarters unless there are quarters to add in; they can be brought directly to pounds by multiplying their number by 112. Children appreciate the comparison between this process and the movement of a railway train, which may pass a station without stopping, if there are no passengers to take up or set down. They can multiply by 112 in one step more quickly than in two (4×28), which further improves the analogy to the "express" train.

Compound addition is easily taught, owing to the analogy which exists between the reduction which must be performed on the sum of the numbers in each column and that which is performed on the sum of the digits in a column in simple addition in order to find the carrying figure. In adding together shillings children often find a difficulty in adding numbers with a tens' digit as well as a units' digit. This can be got over by letting them add the units' digits first and divide this sum by ten, which really reduces the number of shillings to

half-sovereigns. Of course the tens' digits in the shillings column may be regarded as half-sovereigns, and the number divided by two to find the number of sovereigns.

The advantage of treating subtraction as complementary addition is even more marked in compound subtraction than in simple. It is also an advantage to take the complement on the next higher unit, instead of reducing. Some people recommend this process in simple subtraction: thus 6 and **4** are 10, 4 and 3 are **7**, carry 1; 1 and 2 are 3, and **1** are 4. Now in practice nobody regards 13 as a compound quantity consisting of one 10 and three units, but it is always treated as a simple group of thirteen units, except when we are teaching the principles of decimal notation. Hence, although this method gives a smaller stock of complements to be memorised, it is needlessly complex. On the other hand, in the second example we have to find what must be added to 6d. to make 1s. 3d., and we have two processes open, each of which involves two steps—(*a*) we may, first, bring 1s. 3d. to 15d., and, second, find what must be added to 6 to make 15; or (*b*) we may, first, find what must be added to 6d. to make 1s., and, second, increase this by 3, to obtain the difference between 6d. and 1s. 3d. On the whole the second method is preferable, because the complementary parts of a shilling are soon learned, and then the sight of any number of pence immediately suggests its complement, which has only to be added to the digit above it to obtain the required result.

43
26
17

s.	*d.*
4	3
2	6
1	9

Practice in addition and subtraction combined should be given. This may take various forms, but the most useful is that in which the balance left after paying a series of sums from a given amount has to be calculated. In this form the process is of very great use in drawing up balance sheets.

Problems.—A field containing 15 acres 3 roods 18 perches is divided into allotments each containing 2 roods 14 perches. How many allotments are there?

Problems of this type, which consist in finding *how many times* one concrete quantity is contained in another, come under that section of division called *quotition*, and we have already dealt with this subject in connection with simple quantities. As a rule compound quantities must be reduced to the lowest units found in either of them before the division takes place.

15 ac. 3 ro. 18 per.	2 ro. 14 per.	27 94)2538 658
4	40	
63	94	
40		
2538		

Ans. 27 allotments.

Ask children how the correctness of the result can be proved, and the multiplication of 2 roods 14 perches by 27 not only affords an exercise in multiplication, but it leads the children to see how to construct such problems. Let the children build up some problems in quotition, taking care that they are not confined to one table, but are distributed over money and weights and measures.

1. How many persons could receive £3, 9s. 7d. each out of £97, 8s. 4d.?

2. A manufacturer bought some material for £583, 11s. 5½d., at the rate of £4, 16s. 5½d. per ton. How many tons did he buy?

3. How many minutes would it take for 743 galls. 0 qts. 1 pt. of water to run through a tap at the rate of 3 galls. 2 qts. 1 pt. per minute?

4. The total weight of a pile of timber is 33 tons 13 cwt. 20 lb. If each log weighs 1 cwt. 2 qrs. 15 lb., how many logs are there?

A COMPLETE SCHOOL COURSE OF ELEMENTARY GEOMETRY.

Theoretical Course.—It will be necessary to make use of various terms—for example, proposition, theorem, enunciation, corollary, etc.—during this course. These should be explained as required in the formal demonstrations. We shall also make use of certain instinctive truths or axioms, which should also be dealt with as required, and entered separately in notebook under proper heading.

In the practical course we have learned to draw the bisector of any angle, and a perpendicular to a straight line. We shall make use of these constructions before giving a rigid proof of their correctness. We may distinguish them as hypothetical constructions.

Section I. A. Propositions dealing with Angles at a point, and Parallels.

Theorem 1. If a straight line stands on another straight line, the sum of the two angles so formed is equal to two right angles.

Given: The straight line CO meeting AB in C (Fig. 1).

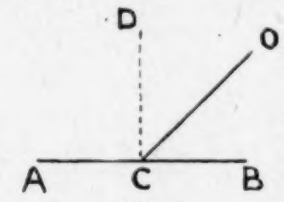


Fig. 1.

To prove ∠BCO + ∠OCA = 2 rt. ∠s.

Construction: Draw CD perpendicular to AB from C.

Proof: ∠s BCO + OCA = ∠s BCO + OCD + DCA

= ∠s BCD + DCA

= 2 rt. ∠s (Constr.). *Q.E.D.*

Alternative proof: By rotation. No construction required. (See earlier practical treatment of angles.)

To measure the ∠s BCO, OCA, a line must turn from the direction CB to direction CO, and then to direction CA. In doing this it makes half a revolution,

∴ ∠s BCO + OCA = 2 rt. ∠s (Defn.). *Q.E.D.*

Corollary.—If any number of straight lines meet at a point, the sum of all the angles made by consecutive lines is four right angles.

Definition of supplementary angles and alternative form of enunciation should be taken.

Theorem 2. If the sum of two adjacent angles is two right angles, the exterior arms of the angles are in the same straight line.

Given: ∠s BCO, OCA = 2 rt. ∠s (see Fig. 1).

Proof: By rotation. In measuring the two given ∠s, the line CB makes half a revolution; ∴ CA is exactly opposite to CB in direction—that is, AB is a straight line. *Q.E.D.*

N.B.—Theorem 2 is the converse of Theorem 1. Explain this fully.

Theorem 3. If two straight lines intersect, the vertically opposite angles are equal.

Given: AB and CD intersecting in E (Fig. 2).

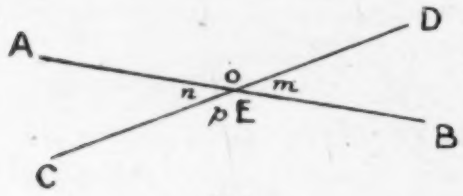


FIG. 2.

To prove $\angle m = \angle n$ and $\angle o = \angle p$.
First, $\angle m + \angle o$ are supplementary (Theor. 1).
$\angle n + \angle o$ " " "
$\therefore \angle m = \angle n$ (Ax.).
Similarly, $\angle o = \angle p$. *Q.E.D.*
Second, prove by considering rotation of a line about E.

Parallel Straight Lines.—Definition: Parallel straight lines are lines having the same direction in a plane, but they do not coincide. Refer to practical work 3*a* and 3*c*.

Theorem 4. If a straight line cutting two other straight lines makes a pair of corresponding angles equal to each other, the two straight lines are parallel.

Given: XY cutting AB and CD in E and F, making $\angle XEB = \angle EFD$ (Fig. 3).

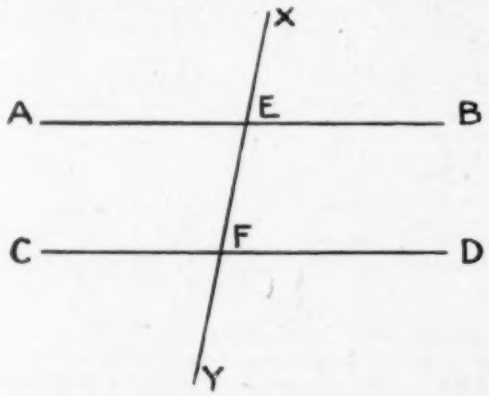


FIG. 3.

To prove AB ∥ CD.
Proof: $\angle XEB$ measures difference of direction between XY and EB (Defn.).
$\angle EFD$ measures difference of direction between XY and FD (Defn.).
These $\angle$s are equal.
$\therefore$ difference between directions XY and EB = difference between directions XY and FD (Ax.).
$\therefore$ EB and FD have the same direction — that is, AB ∥ CD. *Q.E.D.*

Theorem 5. If a straight line cutting two other straight lines makes
(i.) A pair of alternate angles equal, or
(ii.) A pair of interior angles on the same side of the cutting line together equal, to two right angles,
then the two straight lines are parallel.

Given (Fig. 3):
(i.) $\angle AEF = \angle EFD$;
(ii.) $\angle BEF + \angle EFD = 2$ rt. $\angle$s.
To prove AB ∥ CD.
Proof: (i.) $\angle AEF = \angle XEB$ (Theor. 3).
$\therefore \angle XEB = \angle EFD$ (Ax.).
And AB ∥ CD (Theor. 4).
(ii.) $\angle XEB + \angle BEF = \angle BEF + \angle EFD = 2$ rt. $\angle$s.
$\therefore \angle XEB = \angle EFD$.
That is, AB ∥ CD (Theor. 4).
Or prove independently as in Theorem 4. *Q.E.D.*

Theorem 6. If a straight line cuts two parallel straight lines,
(i.) The corresponding angles are equal,
(ii.) The alternate angles are equal,
(iii.) The two interior angles on the same side of the transversal are together equal to two right angles.
(Take Fig. 3.)
Proof: (i.) EB and FD have the same direction.
The difference between these directions and the direction XY is measured by either of the angles XEB, EFD.
$\therefore \angle XEB = \angle EFD$.
(ii.) $\angle XEB = \angle AEF$.
$\therefore \angle AEF = \angle EFD$.
(iii.) $\angle$s AEF + BEF = 2 rt. $\angle$s (Theor. 1).
$\angle AEF = \angle EFD$ (proved above).
$\therefore \angle$s BEF + EFD = 2 rt. $\angle$s. *Q.E.D.*

Theorem 7. The three angles of any triangle are together equal to two right angles.

Given: $\triangle$ ABC (Fig. 4).

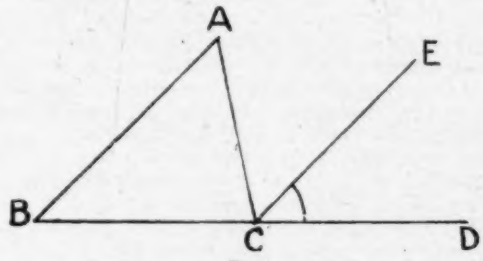


FIG. 4.

To prove $\angle A + \angle B + \angle C = 2$ rt. $\angle$s.
Produce BC to D, and through C draw CE ∥ BA.
Proof: $\angle ECA = \angle CAB$ (Theor. 6).
$\angle ECD = \angle ABC$ "
Add to each $\angle BCA$.
Then $\angle$s BCA + ACE + ECD = the 3 angles of the $\triangle$ = 2 rt. $\angle$s (Theor. 1).
Q.E.D.

Or, alternatively, prove by considering rotation of a line to measure $\angle$s A, B, C.

Cor. 1. If one side of a $\triangle$ be produced, the exterior angle is equal to the sum of the interior non-adjacent angles, and therefore greater than either of them.

Cor. 2. Any two angles of a triangle are together less than two right angles.

Cor. 3. Every triangle has at least two of its angles acute.

Cor. 4. If two angles of one triangle are equal to two angles of another triangle, each to each, the third angle of the one is equal to the third angle of the other.

Theorem 8. The interior angles of any convex polygon together with four right angles are equal to twice as many right angles as the figure has sides. (Definition of polygon to be given.)

Theorem 9. If the sides of any convex polygon are produced in order, the sum of the angles so formed is equal to four right angles

Proofs of Theorems 8 and 9 as in Euclid.

Section I. B. Congruency of Triangles.

Meaning of identical equality. Method of superposition.

Theorem 10. If two triangles have two sides of the one equal to two sides of the other, each to each, and the

angles contained by these sides equal, the triangles are congruent.

Proof as in I. 4.

Theorem 11. If two triangles have two angles of the one equal to two angles of the other, each to each, and a side in one equal to a corresponding side in the other, the triangles are congruent.

Given two triangles ABC, DEF, having ∠s B and C equal to angles E and F, and side BC equal to side EF (Fig. 5).

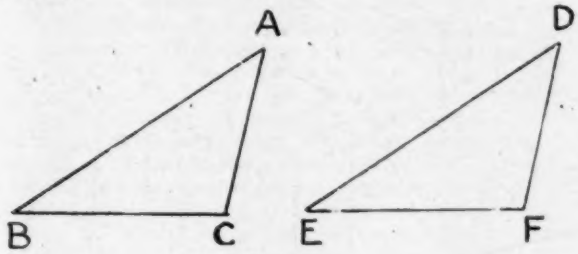


Fig. 5.

To prove triangles ABC and DEF are congruent.

Proof: Apply the △ BAC to the △ EDF so that the point B falls on the point E, and the line BC falls along EF.

Then, because BC = EF, the point C will coincide with the point F.

And because the ∠CBA = ∠FED, BA will fall along ED, and the point A will fall somewhere in ED.

Also, because the ∠BCA = ∠EFD, CA will fall along FD, and the point A will fall somewhere in FD.

∴ point A falls on point D.

And △ BAC coincides with △ EDF.

And the two △s are congruent. *Q.E.D.*

Note.—There is only one case, since, given two angles in each equal, the third angles are also equal. (Theorem 7, Cor. 4.) Hence given side is always adjacent to two equal angles.

Theorem 12. If two sides of a triangle are equal, the angles opposite these sides are equal.

Given △ ABC, having AB equal to AC (Fig. 6).

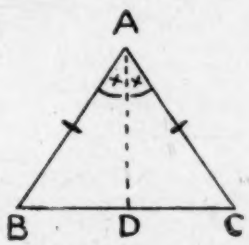


Fig. 6.

To prove ∠ABC = ∠BCA.

Construction: Let AD, the bisector of the angle BAC, be drawn.

Proof: In △s BAD, CAD,

BA = CA (Hyp.),

AD is common,

∠BAD = ∠CAD.

∴ △s are congruent, and in particular

∠ABD = ∠ACD (Theor. 10).

That is, ∠ABC = ∠ACB.

Note.—If AB and AC be produced to E and F,

∠CBE = ∠BCF (Theor. 1).

Theorem 13. If two angles of a triangle are equal, the sides opposite these angles are equal. (Converse of 12.)

Take Fig. 6. Make same construction. Prove by means of Theorem 11.

Theorem 14. If two triangles have the three sides of one equal to the three sides of the other, each to each, the triangles are congruent.

Given two △s ABC, DEF, having AB = DE, BC = EF, CA = FD (Fig. 7).

To prove the two △s are congruent.

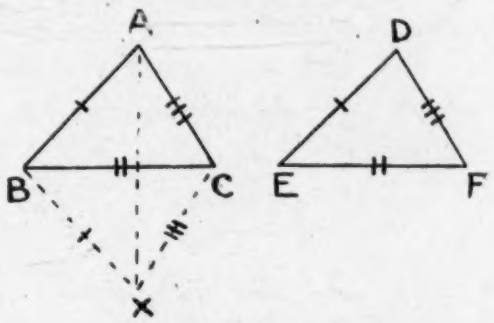


Fig. 7.

Let EF be a side of the △ DEF, which is not less than either of the others.

Proof: Apply the △ DEF to the △ ABC so that the point E falls on the point B, and the straight line EF falls along BC, but with the vertex D on the side of BC opposite to A. Let BXC be its new position. Because EF = BC, the point F will coincide with the point C. Join AX.

Because BA = BX (Hyp.),

∠BAX = ∠BXA (Theor. 12).

And because CA = CX (Hyp.),

∠CAX = ∠CXA (Theor. 12).

∴ ∠BAC = ∠BXC.

That is, ∠BAC = ∠EDF.

And △ ABC is equal in all respects to △ DEF (Theor. 10). *Q.E.D.*

Note.—There is only one case to consider, if a side in DEF, which is not less than either of the other two, be applied to the corresponding side in ABC.

Theorem 15. If two right-angled triangles have their hypotenuses equal, and one side of the one equal to one side of the other, the triangles are congruent.

Given two △s ABC, DEF, having angles at C and E rt. ∠s. AB = DF and AC = DE (Fig. 8).

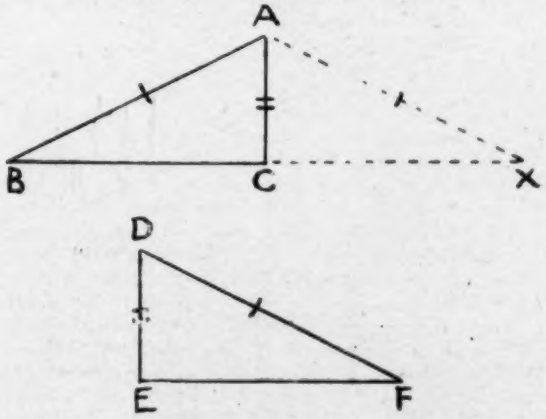


Fig. 8.

To prove △s are congruent.

Proof: Apply △ DEF to △ ABC so that point D

falls on point A, straight line DE falls along AC, but points F and B are on opposite sides of AC. Let ACX be the new position.

Because DE = AC, point E will fall on point C.

And because ∠ ACE = ∠ ACX = a rt. ∠,

BCX is a straight line and ABX is a △.

Now, AB = AX (Hyp.).

∴ ∠ ABX = ∠ AXB.

And △s ABC and ACX are congruent (Theor. 11).

That is, △s ABC and DEF are congruent. *Q.E.D.*

OUR ILLUSTRATED GEOGRAPHICAL NOTEBOOK.

ARGENTINA.

One of the World's Granaries.

ARGENTINA is a republic that bids fair, out of turmoil and confusion, to build up a constitution that shall hold a more dignified position among the great states of the world than has yet been achieved by most of the other South American republics.

History.—The Rio de la Plata was first visited by a party of Spanish explorers in 1516. The leader and several of his attendants were captured by Charrua Indians, who cooked and ate their captives in sight of the survivors, who watched the gruesome proceedings from their vessels. Three or four years later Magellan visited the estuary, but did not land. He proceeded south, and passing through the strait that now bears his name, put the seal on a famous voyage by reaching the East Indies. Sebastian Cabot, in the service of Charles the First of Spain, sailed up the river Plate in 1527. He explored the Parana and Paraguay rivers, and entered into treaties with several Indian tribes. The next twenty years saw a definite attempt on the part of the Spaniards to colonise the country, and for several hundred years Spain ruled the destinies of this fertile territory. Spanish rule was marked by overbearing oppression and continual bloodshed until the year 1810, when the colonists of Buenos Ayres founded a local provisional government. The war of independence that followed was sanguinary and protracted, and only in 1842 did Spain acknowledge the independence of the country. During the next forty years much progress was made, notwithstanding years of disastrous civil war, in which the country was divided into five states. To make matters worse, a five years' war with Paraguay broke out (1865–70). By the year 1890 Argentina had settled most of her longstanding differences with neighbouring states, and then political and financial troubles threatened to bring about her undoing. Fortunately, there were strong men at the head of affairs, and many internal reforms were effected that have done much to remove those difficulties that so long hampered progress and prosperity.

The Country.—Including more or less unsettled territories in the north, and the wild regions of Patagonia in the south, Argentina has an area of 2,903,000 square miles, with a population of less than five millions. With few exceptions, the only elevations are in the neighbourhood of the Andes, which form the western boundary. There are extensive forest regions, and vast plains or *pampas* account for the rest of the country.

The pampas are immense grassy plains, in which for miles and miles no tree or bush is to be seen. During the hot summer months there are vast tracts in which the grass is completely scorched up, but with the coming of rain the arid wilderness is again converted into richest verdure. These plains provide almost unlimited grazing grounds, whereon are herded millions of cattle, sheep, horses, and pigs.

If Argentina were situated in the northern hemisphere, it would extend from the north of England far into the Sahara, and consequently the climate shows considerable variation. On the whole, the climate of the country is temperate and healthy. In the extreme north, as may be expected in the neighbourhood of the tropic of Capricorn, the temperature is very hot; in the extreme south there are bleak winds, with an almost entire absence of rain.

Productions and Industry.—The mineral wealth of the country includes gold, silver, copper, coal, and salt; but they are all practically undeveloped. The greater part of the republic is well watered and remarkably fertile, and the vegetable products are very varied. In the tropical and sub-tropical regions are extensive forests of valuable hard woods, useful for railway sleepers, wharf-piles, and wood paving; and one wood (quebracho) yields an excellent tanning material. Wheat, maize, flax are grown in sufficient quantities for export; tobacco, sugar, jute, and tropical fruits succeed well. Agriculture is receiving increased attention, and there is every indication that Argentina will become one of the recognised granaries of the world.

The chief agricultural products in 1901 were—

	Acres.	*Tons.*
Wheat	8,449,000	2,871,000
Flax	1,518,000	390,000
Maize	3,137,000	2,000,000
Sugar	——	103,000
Vines	110,000	——

At present the rearing of flocks and herds is the staple occupation of the inhabitants, and in this connection it is interesting, by comparison with the Commonwealth of Australia, to estimate the possibilities of the Argentine Republic. The figures are supplied by the British Consul at Buenos Ayres.

Inhabitants.	Area.	Cattle.	Sheep.
Argentina.....4,200,000	1,125,000	28,000,000	110,000,000
Australia.....4,800,000	3,000,000	10,000,000	70,000,000

In 1901 the wool-clip amounted to 250,000 tons, and 329,000 cattle were slaughtered, not nearly so many as would have been the case but for the prevalence of foot-and-mouth disease. The outbreak, too, caused a serious decrease in the export trade. Only recently has the British Government removed the embargo on the importation of live cattle from Argentina into the United Kingdom.

The pampas are dotted with ranches, or *estancias*, the average size of which is 20,000 acres, supporting from two to three thousand head of cattle, or 20,000 sheep. Several hundreds of horses are always to be found on even the smaller ranches. Sheep *estancias* are usually situated in those tracts which bear gigantic thistles, which grow higher than a man on horseback, and are so dense as to necessitate roads being cut through them. The presence of thistles denotes dry land, which is specially favourable to sheep; but the thistles also provide shelter for the sheep from the cold blasts that come from the south. On these vast grazing lands the cattle and horses practically run wild, and only at

intervals are they "rounded up" for branding, or to select animals ready for market.

People.—A greater number of the inhabitants are of white race than is generally the case in South American republics. Though those of Spanish descent predominate, their proportion is steadily decreasing by immigration, for Italians form quite 50 per cent. of the newcomers, compared with 10 per cent. of Spaniards. The oversea immigrants in 1900 numbered 85,000, of whom were 52,000 Italians, and 20,000 Spaniards; of the others only 430 were British.

In the Chubut Valley in Eastern Patagonia is an agricultural colony, with a population of about 3,800, of whom one-third are Welsh-speaking British subjects. The Indians and those of whom no census is taken are estimated at 90,000.

The most interesting of the inhabitants are the *gauchos*, or half-breeds, the descendants of Spanish and Indian parents. They are chiefly herdsmen, and correspond to the "cowboys" of North America. The gaucho is a born horseman, who leads a wild and half-savage life. He is an expert in catching horses and cattle by means of the lasso. He is ignorant and superstitious; lassoing, riding, and gaming are his chief amusements; beef is his chief food, and an infusion of maté his favourite drink.

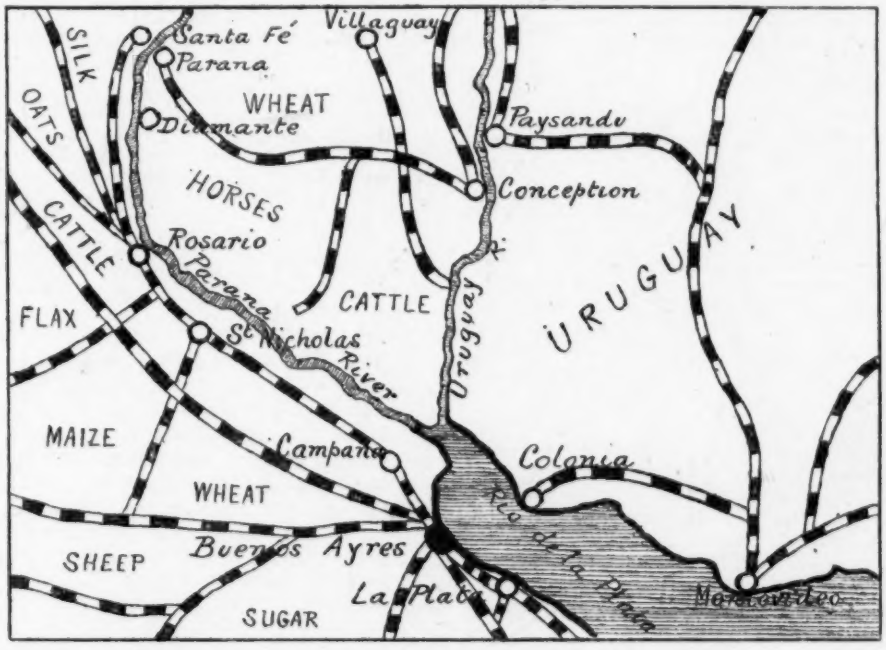
Maté, or Paraguay tea, is the dried leaves of an evergreen shrub belonging to the holly family. The Indians have used the plant from time immemorial, but the Jesuits were the first to cultivate it. The leaves are dried and pulverised. The infusion made from the resulting powder is bitter and unpleasant to the taste of those not accustomed to it; but it is a good restorative after great fatigue, such as is caused by long hours in the saddle. As maté does not appreciably lose its flavour by exposure to the atmosphere, it is particularly useful to ranch employés, who spend so much of their time out of doors.

Commerce.—The *imports* are chiefly textiles and apparel, iron and iron manufactures, pottery and glass, timber and woodwork, beverages, oils, chemicals, tobacco, etc. Total, 113,000,000 dollars, of which in 1900 Great Britain sent 39,000,000 dollars. The chief *exports* were—

	1899. *Dollars.*	1900. *Dollars.*
Animals and their products	115,000,000	71,000,000
Agricultural products	65,000,000	77,000,000
Forest products, etc.	2,208,000	3,508,000
Total	184,917,000	154,600,000

In 1900 were exported—wool, 101,110 tons; sheepskins, 37,590 tons; wheat, 1,929,670 tons; maize, 713,000 tons; beef and mutton, 99,000 tons. Of the total exports, Great Britain took 24,000,000 dollars, among which were—wheat, £6,088,000; fresh mutton, £1,689,000; maize, £1,514,000; fresh beef, £667,000; cattle, £667,000.

Recent consular reports indicate that British trade is losing ground in Argentina; in 1900 it lost quite



11 per cent., while Germany gained 28 per cent. and Italy 8 per cent.

Grain and maize from Argentina frequently reach Great Britain in a very inferior condition to that in which it was loaded up at the port of exportation. Leaving a moderately warm climate, in its voyage to England the cargo passes over the equator and through the tropics. When less heated climes are reached the change of temperature causes condensation in the holds, which in time leads the cargo of grain to ferment, with consequent deterioration. It not infrequently happens that shipping companies pay as much as £12,000 per week in claims for damages during voyages.

The shipping of live stock, too, is far from satisfactory. About 55 cattle and 26 sheep are lost out of every thousand of each class embarked. The same difficulty has been encountered in an attempt to convey cattle from Australasia to Great Britain, when, out of 381 cattle consigned, only 32 reached London alive.

The Board of Agriculture has been devoting much attention to this matter, and now insists on arrangements and precautions that will at least prevent unnecessary suffering being inflicted on the animals during transit.

Internal Communications.—One pressing need of the country is good roads. At present even the main highways are ill-constructed. In the neighbourhood of the large towns the roads are cut up by carts drawn by teams of six or eight bullocks. In winter it is no unusual occurrence for a whole team to be hopelessly involved in the deep ruts. Frequently no help is obtainable, and the animals are left to their fate.

Railway enterprise, however, is opening up the country in all directions. Over 10,000 miles of line connect the capital with the principal cities of the republic, as shown in the accompanying sketch map of the consular districts of Buenos Ayres and Rosario. One line runs almost due west from Buenos Ayres to Mendoza amid the Andine foothills, and from thence it passes over the Andes to Valparaiso on the Pacific coast, a total distance of about 900 miles. Another long section runs *via* Cordoba and Tucuman to Jujuy in the far north, a distance of over 1,000 miles. There are numerous branches intersecting the main lines tapping the more fertile districts, and providing great possibilities of employing capital profitably.

Buenos Ayres, the capital of Argentina, with a population of 850,000, is the eleventh city of the world. It is situated on the Rio de la Plata, 150 miles from the open sea, at a point where the estuary is 28 miles across. The yellow-muddied waters of the Parana and Uruguay are here so shallow that, but for extensive dredging operations, the continual silting up of the channel would not allow the largest vessels to reach the wharves. The city is laid out in ugly monotonous rectangular blocks; the houses are generally of one story, built around a square courtyard. Most of the buildings have flat roofs, where the families assemble in the warm evenings. During troublous times they have formed excellent positions for bodies of sharpshooters. One noticeable feature of the city life is the aversion of the inhabitants to the exercise of walking. There are 276 miles of tramways, mostly electric, in the city, which carried 122,000,000 passengers in 1900. On every hand are men on horseback paying business calls, and everywhere are victorias plying for hire at exceedingly low fares.

The trade of the capital is very largely that of the whole republic. In 1900 from oversea over 1,200 vessels entered the port, and half the total tonnage was British. The climate of the capital and its vicinity is not so favourable as its name ("good airs or breezes") would imply. The city was founded in 1535, and in its early years was twice destroyed by Indians. In 1806 and 1807 the citizens defeated small British forces, and it was these successes that gave encouragement to the revolution against Spain.

It is almost next to impossible to accurately forecast the prospective growth of the Argentine Republic. There are vast areas of fertile soil at present occupied by a very inadequate population. Good government will bring in its wake financial stability, which will enable the state to avail itself of the surplus wealth of the capitalists of other countries. That the country is capable of proving a sound investment is beyond all doubt, and long before the close of the present century Argentina will have gained no uncertain position among the nations. Less favoured peoples that for ever cry, "Give us this day our daily bread," will look towards Argentina, and not in vain.

KING'S SCHOLARSHIP EXAMINATION.

IN future all candidates for the King's Scholarship Examination will be required to fill up a form of application (Form 12 [Exam.] printed below) before they can be admitted to the examination. Every candidate would be well advised to obtain and fill up one of these forms as soon as possible, in order that all the necessary arrangements for admission to the examination may be made.

Form 12 [Exam.].

BOARD OF EDUCATION.

Form of Application to be filled up by all Candidates desiring to attend the King's Scholarship Examination, 1904.

This form, folded with the address outside, must be dispatched to the Board of Education at once. It will not be received after the 1st of October, 1904.

As it is of the utmost importance that the information given by the Candidate should be strictly accurate, the Managers are requested to verify the entries below.

	Surname.	Christian Names.
1. Name of Candidate? (in full).		
2. Exact date of birth?		
3. School in which employed? (Official No. and County should be stated.)		
4. In what capacity employed?		
5. Have you been a Pupil Teacher? If so, give the name of the School, the Official No., and the County.		
6. If not employed in a School now, the particulars of any previous engagement should be given.		
7. If you have been examined previously, state (1) the date of the examination; (2) the result.		

Signature of Candidate.....

Full Postal Address.....

(*Only in the case of a Candidate not employed in a School.*) .....

Date.....

Signature of Correspondent.....

(*Rev. or Esq.*) *of Elementary School, of Principal of Pupil Teacher Centre, or Secretary of Local Education Authority.*

Designation (*Correspondent or otherwise*) .....

Full Postal Address.....

.....

Date.....

THE Board of Education, Secondary Branch, has just issued a paper of rules for new buildings and equipments (Form 1999). These cover all structural details, including the planning of special rooms for cookery, music, art, and science, as well as libraries and teachers' rooms.

The Practical Infant-School Teacher.

TEACHING BY STORIES.

BY THE AUTHOR OF "IN NATURE'S STORYLAND."

RICH children and poor children meet on common ground in the matter of education, in that all receive some kind of instruction in some kind of school. And in all schools the rudimentary instruction admits of little variety with regard to subjects, since there is but one English alphabet, one world to make geography, and one grand English history. Science is within the reach of peer and peasant. The classics alone are withheld from the poor, who, however, according to the philosophy of the late Herbert Spencer, lose little by this omission.

What is Education?

True education consists not in elaborate codes, nor yet in a multiplicity of subjects, but rather in the methods by which subjects are presented to the minds of the pupil. Do these methods cause him to take an interest in his lessons? Do they train him to think for himself? Do they appeal wherever possible to his imagination and judgment? If the methods employed fulfil none of these conditions, but on the contrary are dry, mechanical, and inadequate, the unfortunate pupil is not "educated," but only "instructed." Plenty of material is forced in, but produces nothing of value, and "education" not only implies a "building in" of information, but also a "drawing out" of intelligence.

Once it was the fashion for teachers to be austere, for schoolrooms to show bare walls, for the teaching to be rigid. Now, teachers may smile occasionally; it is not even a crime to share a small joke with the pupils; schoolrooms may be brightened with pictures and flowers; but, unfortunately, methods of teaching have not made a proportionate advance in cheeriness. Perhaps when "teaching by stories" becomes really popular, the Golden Age will have returned to the children's world.

The Limits and Possibilities of Story-Teaching.

Yet story-teaching has limits as well as possibilities. It can neither be applied to all subjects, even in primary schools and classes, nor indiscriminately to children of all ages. As the child becomes older and acquires the power of concentration, the less storylike will be his lessons. But in preparatory schools and kindergartens, and when giving the first lessons in such subjects as reading, history, and geography, most of the teaching, manual exercises excepted, can be given in the form of stories.

Many of us remember the weary repetition of the alphabet in the preparatory school. We were not interested in those funny crooked symbols set out in rows on a card. Our eyes strayed to the golden sunbeams that peeped through the school windows, and those dancing sunbeams made us long to be out in the rose garden away from the loathed repetition of A-A-A, Zed-Zed-Zed. If those twenty-six letters of the alphabet had been arranged as twenty-six little stories, how unflagging would have been the interest, how fixed the attention, unattracted by even such fascinating trifles as sunbeams!

The Story of Cipher-face.

O was a funny round thing. He had no legs like **w**, no head like **g**, no eye like **c**, no tail like **a**. He could do nothing except squeak out a sound like a little girl when her kitten scratches her. **O** had another name—Cipher-face; but he was jealous of his twenty-five brothers and sisters, for all had a limb of some kind, but he had only a fat, round face, with not a leg to stand on. Now, in that schoolroom lived a beautiful fairy called Knowall. It was she who helped the children with their lessons. She felt sorry for the little letter who was always saying "Ō" or "Ŏ." "Little Cipher-face," she remarked on one occasion when he had pronounced his sounds many times, "I will now transform you into quite another letter." Then Fairy Knowall took her wand and added an "eye" and a "tail" to Cipher-face, who immediately became the first letter of Alphabet Town. And his voice was no more a voice of misery, but one of joy; for he could ask plenty of questions, and say what we all say when pleased or surprised—"Ah!" (**a**). In this little story, names and powers of two letters are given.

* * * * *

At a later period of school life came long lists of towns and parrotlike repetition of exports and imports and other geographical items, not omitting wondrous definitions worthy of a place in Mangnall.

All will agree that the best method of learning geography is by travel. Unfortunately, the majority are unable to do this. There is, however, nothing to prevent children from taking imaginary journeys from one place to another, or even a fictitious voyage round the world. Descriptions of beautiful foreign ports, inland excursions made from them, accounts of diamond-mining, tea-growing, or of the people who live in the "Land of the Rising Sun," are eagerly listened to, and always remembered if given in storylike guise. After a course of geographical stories, pupils will become so interested that they will pursue the subject for themselves with little extraneous aid.

And history? Dates? Even now rings in our ears a voice of teacher-like dignity, saying, "Dates are the pegs which alone support the fabric of history." Therefore we learned the dates of the kings from the first to the fourth William, who, like Tennyson's Aurelius, "had lived, and fought, and died." Some of them merely "lived" and "died," leaving the "fighting" for better men, which our history scheme omitted, possibly on the ground that their "dates" were unreliable. But are the royal dates remembered? No! We remember the battle of Crecy—not the date, but the story of the Black Prince. Ah, yes, we remember that, and our faces glow with the memory of a brave deed performed five hundred and fifty years ago. No subject more readily adapts itself to story-teaching than history. Each reign has its great statesman, warrior, or writer. Occasionally the king himself is the most prominent personage of his time. He shall still keep his throne, while others of less exalted lineage but equal talents shall sit beside him. The biographies of all kings, statesmen, warriors, writers make a series of most fascinating stories for children, at the same time inculcating a love of the subject, and giving a good general idea of English history. And after this has been done, dates may be taught, but not as "pegs," and not in such numbers as appear in ordinary date-books.

The Bible is a model history, though practically dateless. Its events and biographies are not always in chronological order, yet each incident has its own peculiar charm, while each story points its own moral.

The first exercises in the art of composition should consist of stories, which, after being told or read to children, should be reproduced by them. Children, too young to write, may be encouraged to retell these tales in their own words; older children will, of course, write them on paper.

And although the majority of our children will receive no classical teaching, yet there is no reason why they should not hear or read the charming myths and legends of ancient Greece and Rome. Kingsley's *Heroes* is a fascinating volume, and its exquisite stories are examples of what can be done in this direction. A knowledge of a good translation of these tales must be beneficial even to boys who will some day read them in the original.

Story-Teaching as an Introduction to Science.

Before it is decided that story-teaching and science, if not actually antagonistic, have theoretically nothing in common, let us read Arabella Buckley's *In the Fairyland of Science*. And in actual practice we shall find that scientific truths, wrapped in the sugary coating of story-teaching, are eagerly swallowed by children.

There is one class of science story, that known as the nature story, which never loses its charm. It tells of the supposed doings of things animate and inanimate, which are often invested with fairylike attributes. Hans Andersen—the prince of story-tellers—was particularly gifted in writing this kind of story. In "The Ugly Duckling," "The Daisy," "The Fir Tree," "Five Peas in a Pod," and many others, descriptions of animals and objects in their natural habitats are given, and are never forgotten because of their fairy-tale environment. Such stories, by arousing curiosity and stimulating the exact observation of common things, cause children to learn some of the facts of nature, upon which natural science is founded. In particular the nature story is a good introduction to the study of botany and zoology.

The Example of "Kiss Letty."

Of the millions interested in education, some will be inclined to view story-teaching with suspicion. They will argue that *that* sort of teaching ill prepares children to meet the difficulties of after-life. But physicians at one time forbade sugar, although the body has ever craved for it. Now these physicians, having found that sugar is not only pleasant to the palate but actually a food, recommend it. It is much the same with stories, which not only satisfy a perfectly healthy craving, but also furnish food for the mind. Thus "teaching by stories" gives information in a pleasant manner, thereby lessening the drudgery which is rarely absent from the beginnings of things.

Judging by the annual output of publishers, we are a story-loving nation. If, then, the grown-up children find that morals are more palatable dished up in the form of stories, may not little children, with their inferior power of concentration and undeveloped will, likewise benefit from story-teaching? For by the latter method the lessons are invested with interest, which is the strongest factor in gaining the attention of children. The Japanese pay their story-tellers. These delightful personages go from house to house, and being well patronised earn a good livelihood, although in Tokio alone there are over five hundred of them. Would that many of our paid teachers could become paid story-tellers, and endeavour to follow the example of the sweet "Kiss Letty." * This charming heroine had one small pupil, by whom she was greatly beloved. And why? Because she told "Boy," the most "beautiful and amazing fairy stories, descriptions of aerial palaces, and glittering winged elves, which fascinated him and kept him in open-mouthed ecstasy. *And somehow he learned a great deal out of what he heard.*" Then when Boy was older, "Kiss Letty" "had a way of narrating [to him] *some of the true histories of the world*, as though they were graceful fantasies. In this fashion she told Boy of the discovery of America by Christopher Columbus, and ever afterwards the famous navigator remained in Boy's mind as a sort of fairy king, who had made a new world."

It is hardly necessary to remind the teacher that although stories may be told occasionally purely as a means of diverting and amusing the children—and if it is known that an interesting story will be told on that occasion, it is surprising how the Friday afternoon attendance can be kept up—yet when the story has an object in view, the connection between the story and its object must be insisted upon. We are all familiar with a certain class of tract which opens with a story, at the end of which the reader too frequently puts the tract aside. Certain advertisements for pills are introduced at the end of skilfully-told tales, and it is difficult to leave off reading them before the articles advertised have been brought to one's notice. So in the didactic story there is great opportunity for the teacher to show her skill in the way in which the lesson is drawn out from the story, and the story is made not merely the means of teaching the lesson, but also an aid to its retention in the child's memory.

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* *Boy.* By Marie Corelli.

Our Modern Language Section

THE STUDY OF SPANISH.

IN no point is the Englishman's failure to appreciate the practical value of modern languages better illustrated than in the almost total neglect of Spanish. There is scarcely a school to be found in which even a few boys are taught the language. Yet it is one of the easiest of modern languages to acquire, and we knew the case of a public school boy, who was a good classic and was very fair at French, setting to work and obtaining a very considerable mastery over the language during his summer vacation. Considering that the language is spoken not only in Spain, but over nearly the whole of South America, the advantages of acquiring Spanish for commercial purposes cannot be over-estimated. Our American cousins have bestowed great attention to the matter, especially since the war, and seem determined that, with natural geographical advantages and acquired linguistic facilities, they will get and keep the trade of the whole continent in their own hands. We have great pleasure in calling our readers' attention to the following books, the three largest of which are published in the United States.

A Practical Course in Spanish. By H. M. Monsanto and Louis A. Languellier.—The lessons are set out on a uniform and methodical plan. Thus in Lesson XIV., which deals with the possessive pronouns, we have a table showing all the forms employed, with their declension; then come parallel columns of examples illustrating their use, and the English equivalents of these illustrative sentences; next an exercise for translation from Spanish into English, and one from English into Spanish. Above these appears a vocabulary, giving the new words introduced; and the lesson concludes with a clear discussion on nine points of grammar and idiom arising out of the lesson. In this way the student acquires his etymology and syntax concurrently, and does not have to wade through pages and pages of irregular verbs before he begins the highly necessary syntax.

El Niño de la Bola. By D. Pedro A. de Alarcón.—This masterly novel has been abridged by the editor, but it seems if anything improved by the process. Most novel readers like to know how the story will end, and when the climax is passed they are generally in a hurry to reach the end. Alarcón spun out the last part of his work in a way that is even tedious, and the editor has made some judicious cuts in this part. He has also pruned away the religious and political discussions which the author had allowed to spring on his theme in the second part. The book is so simple that it hardly demands explanatory notes, and beyond a short introductory chapter, nothing of the sort is attempted. The vocabulary at the end seems to afford all the assistance required.

Doña Perfecta. By B. Pérez Galdós.—In style and diction this novel is perhaps inferior to the preceding, but it is of absorbing interest. It deals with the bigotry of an isolated and ignorant community, and its intolerance of modern conditions. It illustrates the tragic results which are almost certain to follow any narrow-minded adherence to inherited or traditional beliefs. The change which takes place in the leading character, Doña Perfecta, is well brought out. At first she is a lovable woman, devoted to her brother and nephew, eager for the marriage of the latter with her daughter; then she gradually becomes a woman of hate, directly responsible for the cowardly murder of her nephew. The arrangement of text and vocabulary is the same as in the preceding volume, but there are several footnotes where they are needed. These three books are published by the American Book Company.

Los Ladrones de Asturias.—We are pleased to note the enterprise of the Cambridge University Press in producing a book in Spanish. This work consists of the first fifteen chapters of Le Sage's *Gil Blas*, translated from French into Spanish. As many of our readers are familiar with the original account of the adventures of Gil Blas among the robbers, we shall not comment on the text. The introduction and notes are excellent, but for an elementary book it is a pity that a vocabulary has not been provided, especially as the want of a handy Spanish-English dictionary is keenly felt.

DIFFICULTIES OF FRENCH IDIOMS AND CONSTRUCTIONS.

VII.

THE rules as to the placing of adjectives before or after the noun do not present very much trouble. All grammar books give lists of those which invariably precede the noun. Generally speaking, the longer adjectives always follow the noun. Constant reading and experience are the best guides.

Pronouns.

The distinction between *conjunctive* and *disjunctive* pronouns is a little troublesome to the learner, but the difficulties are almost entirely removed if the pupil remembers that the conjunctive pronouns nearly always *precede* the verb, and may not be separated from it except by one another, or by negative adverbs preceding the verb. They follow it when they are used as direct or indirect objects to an imperative. In this case *moi* and *toi* are used instead of *me* and *te*. They also follow it when the order of subject and predicate is inverted in an interrogation. The cases of these pronouns are:—

1. Nominative.
2. Accusative (the case of the *direct* object).
3. Dative (the case of the *indirect* object).

Thus we may say:—

Ils (nominative) parlent tous à la fois.

Nous (nominative) ne désirons pas *lui* (dative) parler.

Vous l' (accusative) très bien arrangé.

J'ai voulu voir la lettre, mais elle ne *me* (dative) *l'* (accusative) a pas montrée.

Whenever a pronoun is not used in immediate connection with a verb, or is separated from the verb by any words than those mentioned above, the disjunctive form must be used. It is also used when two pronouns are linked by a conjunction to form a compound subject. As a consequence of the principles laid down above, it follows that the disjunctive form is used when—

1. The pronoun is used elliptically in answer to a question—*Qui est-ce qui a frappé à la porte? Moi.*

2. When the pronoun is used after a preposition—*J'ai fait une promenade en voiture avec eux.*

3. When the pronoun is used in an exclamatory sense—*Lui, parler de la sorte!*

4. When the pronoun is an antecedent to a relative clause—*Moi, qui vous parle, ai tout vu et tout entendu.*

5. When the pronoun is used in the second term of a comparison—*Nous sommes plus riches qu'eux.*

6. As a complement to the verb *être*—*C'est lui. Ce sont elles.*

The choice of a possessive adjective to correspond with the indefinite pronoun *on* is sometimes a difficulty to beginners. *Son, sa, ses* should be used—*On ne doit pas se vanter de ses richesses.*

Some forms are common to both the relative and the interrogative pronoun *qui*, but it should be noted that—

1. The direct object of the relative is *que*, but of the interrogative pronoun *qui*—*Qui avez-vous ce matin? Je vous enverrai le livre que j'ai acheté hier.*

2. *Dont* is only relative. It corresponds with the interrogative *de qui*—*Voici l'homme dont j'ai parlé. De qui parlez-vous?*

UNIVERSITY OF LONDON.

MATRICULATION EXAMINATION.

January 1904.

GERMAN.

Examiners { Prof. A. W. Schüddekopf, Ph.D., M.A. / F. Storr, Esq., B.A.

THURSDAY, January 14—*Afternoon*, 2 *to* 5.

I. Translate into English:—

A.

Das Geschäft war ein Warengeschäft, wie sie jetzt immer seltener werden, jetzt, wo Eisenbahnen und Telegraphen See und Inland verbinden, wo jeder Kaufmann aus den Seestädten durch seine Agenten die Waren tief im Lande verkaufen lässt, fast bevor sie im Hafen angelangt sind, so selten, dass unsere Nachkommen diese Art des Handels kaum weniger fremdartig finden werden, als wir den Marktverkehr zu Timbuktu oder in einem Kaffernkraal. Und doch hatte dies alte weit bekannte Binnengeschäft (*home trading house*) ein stolzes, ja fürstliches Ansehen, und, was mehr wert ist, es war ganz gemacht, bei seinen Teilhabern feste Gesinnung und ein sicheres Selbstgefühl zu schaffen. Die Bedeutung einer Handlung beruhte damals auf den Massen der Waren, welche sie mit eigenem Gelde gekauft hatte und auf eigene Gefahr vorrätig hielt. Auf den Packhöfen (*warehouse*) am Flusse lag in langen Speichern ein grosser Teil der fremden Waren aufgestapelt, ein kleinerer Teil in den Kellern und Gewölben des alten Hauses selbst, viele Vorräte in Speichern und Remisen der Nachbarschaft. Zahlreiche Kaufleute in der Provinz versorgten sich aus den Magazinen der Handlung mit Kolonialwaren und den tausend guten Erzeugnissen der Fremde, welche uns ein tägliches Bedürfnis geworden sind. Aber auch über die Grenzen des Landes hinaus, nach dem Süden und Osten, bis an die türkische Grenze, sassen die Agenten des Hauses, und dieser Teil des Geschäftes, vielleicht weniger regelmässig und sicher, galt zur Zeit für die gewinnreichste Tätigkeit der Handlung. Gustav Freytag.

B.

Der Mai ist gekommen, die Bäume schlagen aus;
Da bleibe, wer Lust hat, mit Sorgen zu Haus!
Wie die Wolken wandern am himmlischen Zelt,
So steht auch mir der Sinn (*my mind is bent upon wandering*) in die weite, weite Welt.

Herr Vater, Frau Mutter, dass Gott euch behüt'!
Wer weiss, wo in der Ferne mein Glück mir noch blüht!
Es giebt so manche Strasse, da nimmer ich marchiert,
Es giebt so manchen Wein, den ich nimmer noch probiert.

Frisch auf drum, frisch auf im hellen Sonnenstrahl!
Wohl über die Berge, wohl durch das tiefe Tal!
Die Quellen erklingen, die Bäume rauschen all',
Mein Herz ist wie 'ne Lerche und stimmet ein mit Schall.

Und abends im Städtlein, da kehr' ich durstig ein:
Herr Wirt, mein Herr Wirt, eine Kanne blanken Wein!
Ergreife die Fiedel, du lust'ger Spielmann, du,
Von meinem Schatz das Liedel, das sing' ich dazu.

Und find' ich eine Herberg', so lieg' ich die Nacht
Wohl unter blauem Himmel, die Sterne halten Wacht.
Im Winde die Linde, die rauscht mich ein (*to lull to sleep*) gemach (*gently*),
Es küsset in der Früh' das Morgenrot mich wach.

O Wandern, o Wandern, du freie Burschenlust!
Da wehet Gottes Odem so frisch in die Brust;
Da singet und jauchzet das Herz zum Himmelszelt:
Wie bist du doch so schön, o du weite, weite Welt!

Emanuel Geibel.

II. Either write about twenty-five lines (250 words) in German on *one* of the following subjects:—

(*a*) Der Charakter Heinrichs des Achten.

(*b*) Das Leben und Treiben auf einem Londoner Bahnhofe.

(*c*) Beschreiben Sie in einem an einen Freund (oder eine Freundin) gerichteten Briefe eine Ihnen bekannte Gemäldesammlung.

Or translate into German:—

Frederick the Great rang the bell (*klingeln*) one day, and, as nobody appeared, he opened the door of the ante-chamber and found his page sleeping upon a chair. When he was about to wake him he saw a piece of paper covered with writing (*beschrieben*) hanging out of his pocket. This roused the king's curiosity and attention. He pulled it out and found that it was a letter from the page's mother, in which she thanked him for his kind support. Heaven, she said, would certainly reward him if he remained faithful to his Majesty. The king at once fetched a roll of ducats (*Dukaten*) and put them secretly with the letter into the page's pocket. Soon after he rang again and waked the page, who appeared before him. "Thou hast certainly been asleep," said the king. The boy stammered (*stammeln*) an excuse, and putting his hand into his pocket, to his great astonishment found the money. He pulled it out, pale and trembling, and unable to speak a word. "What is it?" said the king. "O your Majesty," answered the page, falling upon his knees, "some one desires (*wollen*) my ruin; I know nothing about the money!" "Know," said the king, "that when fortune (*Glück*) comes, it comes when we sleep. Thou canst send the money to thy mother, and give her the assurance that I will look after (*sorgen für*) both of you."

III. Questions on Grammar:—

[N.B.—*All words and phrases mentioned in Questions* 1 *and* 2 *occur in Extracts I.* (a) *and* (b).]

1. Give the nominative singular (with the definite article) of *Telegraphen, Waren, Speichern, Gewölben, Vorräte, Packhöfen, Magazinen.* Replace *Odem* by another word more generally used in German prose. Give another meaning of *Handlung.* Give the genitive plural (without the article) of *ein kleinerer Teil.* Account for the gender of *Ansehen, Geschäft, Nachbarschaft.* Is *doch* in *wie bist du doch so schön* stressed or not? Give reasons.

2. Give the second person singular of the present indicative and the past participle of *lässt, schaffen, hielt, sassen, galt,* and the first person plural of the imperfect indicative of the verbs from which *Bedürfnis* and *Fluss* are derived. Derive abstract nouns (which must not end in *-ung*) from *verbinden, hielt, sassen, steht, klingen, greifen.* Account for the use of the subjunctive mood in *bleibe* and *behüt'*, and for the inversion of subject and verb in *und find' ich keine Herberg'.*

3. Translate.—He should have spoken sooner. With a few friends. With a pair of boots. This is the first time I have asked a favour of him. I was advised to translate this page from English into Latin.

L'ours des Pyrénées.—L'ours est une bête grave, toute montagnarde, curieuse à voir dans sa houppelande grisâtre ou jaune de poils feutrés. Sa grosse fourrure est un excellent manteau contre la neige. Les montagnards la jugent très bonne car ils la lui empruntent le plus souvent qu'ils peuvent et il la juge très bonne aussi car il la défend le mieux qu'il peut. Les arbres creux lui fournissent une maison toute prête.

Brave, prudent, robuste, c'est un animal estimable; ses seuls défauts sont de manger ses petits, quand il les rencontre, et de mal danser.—Taine (*Voyage aux Pyrenées*).

FRENCH PRIZE COMPETITION.

RULES.

1. All translations should be **posted not later than April 8**, and addressed:—PRIZE EDITOR, Office of the *Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.

ALTERATION IN RULE 3.

3. Competitors should write pseudonym only on MS. Prize-winner will be asked to send name and address for publication.
4. No competitor may take the prize offered more than once in three months.

A Prize of Half a Guinea is offered for the best rendering into English of the following extract:—

Etre cultivé, cela ne veut pas dire spécialement savant en quoi que ce soit. Un numismate, érudit en sa partie, peut être un homme sans culture, s'il ne possède pas cet ensemble de notions grâce à quoi, selon le mot de Térence, rien d'humain ne vous est étranger. La vraie culture est générale ; elle est l'opposé de la spécialisation. L'on vous dira que la spécialisation est seule désirable aujourd'hui, parce que la société a besoin de sujets qui excellent en leur partie. L'on vous dira même qu'elle est seule possible, parce que le trésor des connaissances s'est démesurément accru, et que l'esprit humain, s'il veut l'acquérir, se condamne à la banqueroute. Vous répondrez hardiment à ces ennemis de la culture générale que leurs raisons ne valent rien. Il n'est pas vrai qu'un esprit ait plus à comprendre et plus à retenir aujourd'hui qu'au XVI^e^ siècle, par exemple, pour mériter l'épithète de cultivé. Alors comme aujourd'hui, il y avait des théories de physique, de chimie, une science de la terre et des éléments : s'il vous prend la fantaisie d'ouvrir un des livres de ce temps-là, vous verrez que pour être moins fondées sur l'observation, ces théories n'en étaient pas plus simples. En outre, la culture générale s'encombrait alors d'un inextricable fatras d'argumentation, aboli de nos jours. Dans l'intérêt de sa paresse, un paresseux ferait mieux, croyez-moi, de suivre les cours du Collège de France sous M. Gaston Paris, qu'au lendemain de sa fondation. D'autre part, aujourd'hui comme alors, un spécialiste sans culture générale était un organisme incomplet, réputé pour tel. Et sans doute, à cette volonté de n'ignorer rien, les artistes de la Renaissance durent d'être les plus grands artistes de tous les temps.

MARCEL PRÉVOST.

RESULT OF THE MARCH COMPETITION.

The prize is awarded to "Fitzthomas." Will "Fitzthomas" kindly send name and address for publication?

First Class.—La Printanière, Hero, Ceylon, Picciola, Kyleside, Agaznog, Pamphilon, C.E.M., Beth May, Amry, Kettering, Nemo, The Country Girl, Jane, Gawayn, Artemis, Arethusa, Corona, Dolores, Lorine, Une paysanne, Jörn Uhl, Indigens, St. Clair, Coelia, Adlitam, L'hommeau, Anne, Matley, M.J.P.N., Blinsee, Shakspere, Day Dawn, April Diamond, Scotland, Meriden, Chantilly, Minnehaha, Kartinka, Ymp, Teta, Lissa, Edzell, Beebo, Nythsdale, Tyro, Mea, Mathilde, Emdy Elem, Aquinas, Antoinette, Luna, B.S., Welburn, Perseus, Clcante, Fidèle, Garryhesta, D'Arcy, Croissant, La belle France, Aim, Shylock, £. s. d., Claren, Alexandrine, Grimbarian, Woodlands, Guillaume, Chacun son goût, Fleur, Dafydd ap Iago, Camerwick.

Second Class.—Ephèbe, Ivy, Cat, Winston Churchill, Miltiades, Lytton, Lorna, Uncertain, Albert, Très bousculée, S.R.H., Dot, Orival, Attempt, Minnehaha, M.A.W., Marie, Marcelle, Margarita, Cui bono, Eglantine, Aphrodite, High Peak, Snowdrop, Geraldine, Kelso, Woolley, Nortonius, R.N., Susie, White Heather, Jess, Rex, Bazin, Flora, Rainbow, Bea, Seaton, Luccombe.

Report.

The number of very good papers is not large, although the proportion of those who get into the first class is considerable. Of quite a third of these it might better be said that they have escaped getting into the second class. *Qualité* was mistranslated by a large number. It means "station" or "rank." The idiomatic phrase *Rien qu'à se sentir si seuls* also produced a great many awkward translations. Read in connection with what follows, it should present no difficulty. *L'agent véreux d'affaires* produced some curious renderings, some making the adjective mean "worm-eaten." It means a shady man of business, hardly a "lawyer," as Fitzthomas has put it.

Prize Translation.

Be convinced, he continued, that there is among these men of the world a vice inherent to their position. Their defect in regard to everything is not to know how to do anything for themselves. They have only learned to command, to give orders. Now, in business, these same words, while they still express certain modes of action, acquire a very special signification. To command, to give orders, mean henceforth to direct a thousand things, to undertake a thousand responsibilities. And how do you suppose these men can manage for themselves in such a case? They have always had a valet to arrange their coat, their shirt, and their pumps; their parents have made a fortune for them. And it is the lawyer and stockbroker who day by day arranged their rights and their incomes for them. And whilst they were dissipating their inheritance a young girl was ripening for them, preparing to let them dine off her fortune, when at about thirty years of age they should have finished breakfasting off their own money. Yes, but later the hour and the need for supper may come; and then there is no longer any one to give it to them—at least, not so benevolently. You may rest assured the character of these people, who are accustomed to the ease of high life, is not changed when they are installed in an office—before everything a comfortable one—where presumably they will carry on a large business. Feeling themselves very much alone, their first care is to have five-and-twenty bells installed, as if to call the devil and all his train to their service by electricity. Then do you know who comes infallibly in proportion as they press the buttons? It is the rascally lawyer, who comes to relieve them of their rights; the bailiff, who hurries to lay his hands even on their clothes and their linen; and last of all, sometimes the policeman comes, who in his turn proceeds to disburden them of the little honour which there would still be in store.

ENTREVUE DE BISMARCK ET DE NAPOLEON III.

HIER, à cinq heures dans la matinée, après avoir négocié jusqu'à une heure du matin avec Moltke et les généraux français les conditions de la capitulation, le général Reille, que je connais, m'éveilla pour me dire que Napoléon désirait me parler. Je piquai des deux vers Sedan, sans m'être lavé et sans avoir déjeuné; je trouvai l'empereur dans une voiture découverte avec trois adjudants; trois autres se tenaient à cheval à côté de l'équipage. Je descendis de ma monture, je saluai Napoléon aussi poliment qu'aux Tuileries et je lui demandai ses ordres. Il désirait voir le roi: je lui dis, ce qui était vrai, que sa Majesté avait son quartier à trois lieues de la ville, dans l'endroit où je t'écris maintenant. A la question de Napoléon qui demandait où il devait se rendre, je lui offris, car je ne connaissais pas la contrée, mon quartier de Donchéry, petite localité située tout près de Sedan; il accepta et partit en voiture de notre côté, dans le silence du matin, conduit par ses six Français, par moi et par Charles qui m'avait rejoint à cheval dans l'intervalle. Avant d'arriver au village, il craignit un rassemblement possible et me demanda s'il ne pouvait descendre dans une maison d'ouvrier, qui s'élevait solitaire, sur le chemin; je la fis visiter par Charles qui annonça que c'était une habitation misérable et malpropre; "N'importe!" dit Napoléon, et je montai avec lui un escalier étroit et délabré. Nous restâmes une heure dans une chambre de dix pieds carrés, renfermant une table en bois de sapin et deux chaises de jonc; nos compagnons étaient en bas.

Quel puissant contraste avec notre dernière entrevue aux Tuileries en 1867!—BISMARCK (*Lettres à sa femme*).

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Late Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SCHOLARSHIP COURSE FOR DECEMBER 1904.
Fourth Month—April.

Work to be Prepared.

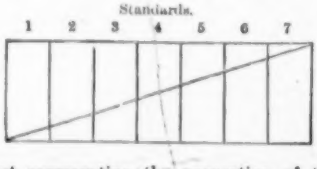
1. *Reading and Repetition.*—Steady practice must be taken in these subjects. Correct verbal repetition is not sufficient; there must be proper emphasis, modulation, etc.

2. *Teaching.* Chap. iv., *Scholarship School Management:* The teaching of Reading. As reading is the most important of the three R's, the proper method of teaching the subject is necessarily very important. The student should know the three systems—alphabetic, phonic, and look-and-say; their advantages and disadvantages; and how they may be combined to produce the *best* system, which is based on the phonic supplemented by the other two. Good reading depends upon two qualities—(1) good utterance, the merely mechanical part of the work, and (2) intelligence, the intellectual part which is evidenced by the expression of the reader. If these points are further analysed, we find that each is capable of subdivision.

Good utterance ..... { 1. Correct pronunciation, depending upon..... { Pronouncing vowels. / Enunciating consonants. / Correct accent.
2. Good delivery, resulting from..... { Fluency. / Correct pitch. / Deliberation.

Intelligent reading is shown by..... { Proper emphasis. / Proper modulation.

Mistakes or faults in reading arise from neglect of one of these. Mistakes in vowels are frequently "provincialisms," and are difficult to eradicate. Mistakes in enunciation—for example, slurring, stammering, stuttering, lisping, omission, substitution, or insertion of letters—may generally be remedied by systematic practice with selected words and sentences. Accent is learned only by imitation. Fluency and pitch may be acquired from pattern reading and proper phrasing. But it must be borne in mind that when the utterance is perfect, the reading may still be monotonous and lifeless. Unless the reader understands to the full what is being read, and expresses the author's meaning by emphasis and modulation, the production cannot be called good. Students frequently forget this. They are content to do the mechanical part accurately, but pay insufficient attention to the more intellectual side. The advantages and disadvantages of simultaneous reading and of silent reading should also be noted. The division of the time of a reading lesson between the mechanical and intellectual parts may be approximately indicated by a diagram, thus:—

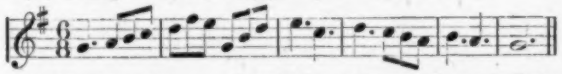


the upper part representing the proportion of time given to mechanical work, the lower the amount given to style, explanation, and acquisition of knowledge. Satisfy yourself that you can answer all the questions on reading at the end of the book.

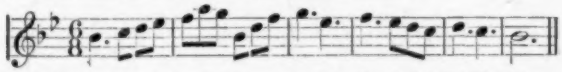
3. *Drawing.*—One or two copies each week from photographs of casts and foliage, with an occasional study of a spray of leaves, or a growing plant. Aim at correct proportion, smooth curves, and freedom of execution. Use a brush and sepia in preference to lead or pen and ink.

4. *Music.*—Continue practice in transposition. The following are typical questions, which may be multiplied indefinitely.

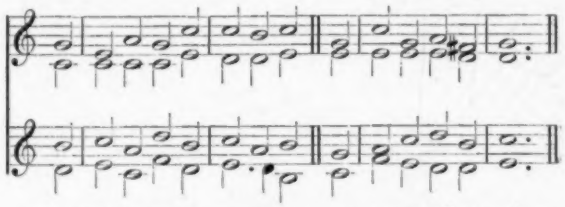
(1.) Transpose the following passage into key B♭.



The signature tells you that the key is G, and that G is **Doh.** Prepare the staff and bars, insert correct signature, and then you will notice that each note has to be raised a minor third, or you can refer each note to its place in the scale.



(2.) Write the following hymn tune in Tonic Sol-Fa Notation.



The key from the signature is C; the time is 4 pulse. Prepare measures, and then write the notes, thus:—

:s	m	:l	s	:d'	d'	:t	d'	:s	d'	:s	l	:fe	s	:- |- ‖
:d	d	:d	d	:m	r	:r	m	:m	m	:m	m	:r	r	:- |- ‖

:t	d'	:l	r'	:t	d'	:l	t	:s	l	:d'	r'	:t	d'	:- |- ‖
:r	m	:d	f	:r	m	:-.r	t,	:d	f	:m	r	:r	m	:- |- ‖

5. *Penmanship.*—Ten minutes' daily practice, and great care at all times.

6. *Composition.*—Write one or two essays each week on such subjects as—

(*a*) Modern means of communication.
(*b*) Character of Beatrice, in *Much Ado about Nothing.*
(*c*) Difficulties of African exploration.
(*d*) Slavery.
(*e*) Description of some manufacture.
(*f*) Canada as a field for emigration.
(*g*) Contentment is better than riches.
(*h*) Our food supply.

Read up the subjects, if necessary. Make an analysis of your ideas, prepare an outline, write your essay roughly, and then revise and polish it into your best.

Notes on the subjects set:—

(*a*) Little reading will be necessary for this. A few words about railways, steamships, omnibuses, tramcars, cycles, telegraph, telephone, etc., will form the substance of the essay. You might point out, if you can, in which direction travelling is likely to improve and develop. The great advantages are also worth notice.

(*b*) This should be easy after reading the play. Specify particular features in the character, and prove by quotations.

(*c*) If you have read any account of a journey in Africa—for example, *How I found Livingstone, Through the Dark Continent*, etc.—you will need little assistance in this. The absence of great openings in the coast, the unnavigable character of the rivers, the malarial belt round the coast, the plague of flies which prevents animal transport, the difficulties with native *pagazis* or bearers, the continual petty warfares, the fanaticism of the Mohammedan Arabs, all conspire to make and keep Africa as the dark continent.

(*d*) Note the widespread nature of the institution, especially in non-Christian countries. Say anything you can of the history of it in connection with the British Empire, etc.

(*f*) This should be easy to any one who has read the pamphlets and handbooks issued by the Dominion Government. A fine climate, cheap and fertile land, abundance of animal, vegetable, and mineral wealth, British institutions, should make Canada a much more popular country than it is.

(*g*) You can reason for and against this. Too much contentment may become laziness. Whether riches are good or not depends upon how they are used.

(*h*) Point out how little of our food we grow for ourselves in England. Show where the various articles come from, how they come, and their value.

7. *English.*—(*a*) Twenty-five roots and meanings each week.

(*b*) *Much Ado about Nothing*, Act II., Scenes ii. and iii.

(*c*) The essay on "Great Place."

(*d*) The language from 1250–1500.

(*e*) The grammar and syntax of the noun.

The grammar of the noun is very important. Note carefully in connection with this—

(1.) Number—nouns with two plurals, with no plural, with no singular, the plurals of foreign nouns.

(2.) Gender—ways of forming feminine from masculine, and irregulars.

(3.) Case—nominative absolute, in apposition, of address. Object, direct and indirect. Cognate, factitive, adverbial, residual, etc.

Learn definitions of each, and be prepared to give examples. The adverbial object expresses time, distance, etc: He walked a *mile*; one *night* he came home. The residual object is found only with verbs that in the active voice take two objects; for example: They taught him music (active). He was taught *music* (passive). They made him king (active). He was made *king* (passive).

8. *Geography.*—(*a*) Revise Asia generally, and Asia Minor, Persia, and Arabia in detail; (*b*) the British possessions in South Africa.

Use maps continually. Get a clear idea of the "build" of Asia, and, if possible, model a map in clay or plasticine. This will show you the general lie of the country, the direction of the rivers, and the prevailing conditions of climate. Productions, imports, exports, towns, and government should receive particular attention under each separate country.

Possessions in South Africa. The following table gives the more important points to be committed to the notebook and to memory:—

Colony.	Area in Sq. Miles.	Population.	Productions, etc.	Towns.	Government.	Notabilia.
Cape Colony.	276,995	2½ millions.	*Exports.* — Produce of mines, sheep, cattle, ostrich feathers, wine, etc. *Imports.*—Cotton goods, apparel, books, machinery, hardware, stationery, provisions, leather, spirits.	Cape Town, Grahamstown, Port Elizabeth, Kimberley, Beaconsfield, etc.	Responsible government. Governor—Sir W. Hely Hutchinson. Legislative Council, 23; House of Assembly, 95.	Karroos, copper mines, diamond mining.
Basutoland.	10,000	263,000	*Exports.*—Grain, wool, cattle, horses. *Imports.*—Blankets, hardware, groceries.	Maseru.	Crown Colony under a Resident Commissioner.	
Bechuanaland Protectorate.	400,000		*Exports.*—Mealies (maize), wool, hides.	Vryburg, Mafeking.	Under Commissioner.	Rinderpest in cattle.
The Transvaal.	111,700	¾ million.	*Exports.*—Gold from the Rand. *Imports.* — Machinery, food, clothing, etc.	Pretoria, Johannesburg.	Governor (Lord Milner), aided by Executive and Legislative Council. Self-government will soon be introduced.	The gold reefs of the Rand. General barren character of the country. History of the Boers.
Orange River Colony.	48,400	200,000	*Exports.*—Wool, ostrich feathers, hides, diamonds, grain. *Imports.*—As the Transvaal.	Bloemfontein.	As the Transvaal.	
Natal.	29,200	1 million.	*Exports.*—Wool, sugar, hides, skins, coal, grain, tea. *Imports.*—Mainly as the Cape.	Pietermaritzburg, Durban, Glencoe, Ladysmith, etc.	Responsible government. Governor. Legislative Council of 12; Legislative Assembly of 43.	Terraces and products. The Zulus and Zululand.
Rhodesia.		1 million.	Rich in mineral deposits. Suitable for all European fruits and vegetables. Few exports. *Imports.*—Clothing, tools, machinery, and food.	Salisbury, Buluwayo, Umtali, Tuli, Gwelo, Gwanda.	Administered by British South Africa Company under charter.	Gold-mining methods. Life of Cecil Rhodes.

Cape to Cairo Railway runs from Cape Town, De Aar, Kimberley, Vryburg, Buluwayo, Salisbury. From Buluwayo the line runs to the Wankie coal-fields. The line, after crossing the Zambesi near the Falls, will be carried to the south end of Tanganyika. Salisbury is also connected with Beira by railway. The standard gauge is 3 feet 6 inches. The Trans-Continental Telegraph Line runs from Cape Town to Ujiji.

9. *History.*—Edward the First, Edward the Second, Edward the Third, and Richard the Second.

These reigns cover a very important period in English history, marked by (*a*) the establishment of law on a proper basis; (*b*) the commencement of the long struggle with France; (*c*) the revolt of the villeins against the conditions of life imposed upon them by the Feudal System. The reign of Edward the First is mainly concerned with two great movements—(*a*) to consolidate and improve the law, and (*b*) the attempt to reduce the whole of the island under one supreme authority. In legal matters the following statutes should be studied:—

1275. First Statute of Westminster—freedom of election, and limitation of feudal aids.

1278. Statute of Gloucester—regulated the procedure of minor courts, and issued the *Quo Warranto* writs.

1279 Statute of Mortmain, or *De Religiosis*—to prevent lands passing into the hands of the church and other corporate bodies, whereby the king lost both men and money.

1284. Statute of Wales—imposing English law on Wales.

1285. Second Statute of Westminster—establishing the law and principle of entail.

1285. Statute of Winchester—dealing with minor police regulations (origin of justices of the peace).

1285. *Circumspecte Agatis*—limiting the jurisdiction of the spiritual courts.

1290. *Quia Emptores*—passed to prevent the continual subinfeudation which was taking place.

Edward remodelled and divided the law courts; established an adequate staff of judges. Whereas the *Magnum Concilium* acted originally as both the legislative and judicial bodies, and the *Curia Regis* had later on attempted to cope with the number of law cases, Edward set up distinct tribunals—

(*a*) Court of Exchequer—causes concerning royal revenue.

(*b*) Court of Common Pleas—suits between private persons.

(*c*) Court of King's Bench—suits between private persons and the sovereign.

The conquest of Wales must be learned, and the *causes* of Edward's interference in Scotch affairs. Learn a genealogical table showing the exact relationship of Balliol and Bruce.

Edward the Second.—His favourites and their fates; Bannockburn, and general misrule.

Edward the Third.—The Hundred Years' War. Note carefully the causes. Edward's claim to the throne was *not* the cause. The interference of the French with the cities of Flanders and the attempt of Philip to seize Aquitaine were the chief causes. The claim was not put forward till afterwards. Learn

plans of Crecy and Poitiers. The Black Death and Statute of Labourers severely affected the social life of the poor.

Note also Statute of Provisors, Statute of Treason (limiting the offence to certain definite acts), Statute of *Præmunire*, Statute of Staples. The last years were troubled—an infirm king with unworthy favourites; a growing dissatisfaction at the expense and conduct of the war; a miserable commons. Note the work of the "Good" Parliament.

Richard the Second.—The peasants' revolt against their intolerable condition. Causes—the state of villenage, the Black Death and Statute of Labourers, the socialistic teaching of Wycliffe's poor preachers, discontent at the conduct of the war, the heavy taxation, and the unjust poll tax. The demands made indicate the grievances: (*a*) Abolition of villenage and customary service; (*b*) abolition of excessive market dues; (*c*) land to be let at 4d. per acre.

10. *Arithmetic.*—Work Nos. 301–400 General Examples, Christian and Collar. Revise ratio, proportion, proportional parts, partnership, and mixtures (up to p. 271). The theory of ratio and proportion must be thoroughly mastered. Learn exact definition, with examples of ratio, direct, inverse, duplicate, triplicate, compound, etc.

If any difficulty is found, send for solution.

The following have been submitted:—

No. 228. *A boat moves down stream at the rate of a mile in six minutes, and up stream at the rate of six miles per hour. What is the velocity of the current?*

In all sums of this kind it must be remembered that the rate of the stream adds to the rate down stream, and takes off from the rate up stream. If a boat goes 10 miles an hour in still water, then on a river running 4 miles an hour it will go 10 + 4 = 14 miles an hour down stream, and 10 − 4 = 6 miles an hour up stream. The difference in the two rates is *twice* the rate of the stream. In the case given, rate down stream = 10 miles, up = 6 miles. The difference, 4 miles, is twice the rate of the stream. Therefore the stream runs 2 miles per hour.

No. 269. *A man went to market and spent* £200. *He bought* 200 *animals—sheep, pigs, and geese. For each sheep he gave* £5, *for each pig* £1, *and for each goose* 1s. *How many of each did he buy?*

The average price is £1.

Each sheep at £5 is £4 or 80s. *above* the average.

Each pig at £1 is *at* the average.

Each goose at 1s. is 19s. *below* the average.

To keep the average, losses and gains must be balanced.

Thus 19 sheep and 80 geese average £1 apiece.

Add 1 pig, then 19 sheep, 1 pig, 80 geese, average £1 per head; or 38 sheep, 2 pigs, 160 geese (200), average £1 per head.

Or another answer may be found by keeping the ratio 19 sheep and 80 geese, and filling up the number 101 with pigs.

No. 270. *How far may I travel in a coach at* 8 *miles per hour, starting at* 10 *a.m., in order to return on foot to the starting-place at the rate of* $3\frac{1}{2}$ *miles per hour by* 32 *minutes past* 2?

Time taken in going 1 mile out = $\frac{1}{8}$ hour.

Time taken in coming 1 mile back = $\frac{2}{7}$ hour.

∴ to do 1 mile out and back = $\frac{1}{8} + \frac{2}{7}$ hour = $\frac{7}{56}$ hour.

Total time available = 4 hours 32 minutes.

By proportion—Distance out and back in $\frac{7}{56}$ hour = 1 mile.

Distance out and back in 1 hour = $\frac{56}{7}$ mile.

Distance out and back in $4\frac{32}{60}$ = $\frac{272}{60} \times 4\frac{5}{7}$

= $10\frac{1}{2}$ miles.

11. *Algebra.*—Problems leading to quadratics.

12. *Euclid.*—Props. 31–40, with six deductions per week.

13. *Elementary Science.*—Radiation, rectilineal propagation, reflection and refraction, analysis of light, colour disc, the spectrum and spectroscope.

14. *General Information.*—Read up answers to two or three of the papers in one of the books of questions recommended.

Test Paper in General Information.

Answers will be marked gratis if sent direct to Mr. A. T. Flux, Oakleigh, Belvedere, Kent, with stamped addressed envelope enclosed for return.

1. What is the meaning of the following abbreviations—p.m., F.P., M.R.C.P., net, MSS., i.e., A.M.C., P.S.?

2. In what books do the following characters occur—The Red Cross Knight, Amyas Leigh, Mrs. Malaprop, Gurth, William of Deloraine, The Knight of the Leopard, Hettey Sorrell, Legree?

3. What is the difference between a hare and a rabbit, an alligator and a crocodile, a tiger and a panther, a turtle and a tortoise, a whale and a shark?

4. What is an eclipse? How and when is it produced? Illustrate by diagram.

5. What is a telephone? How does it act?

6. Divide quadrupeds into classes, and give the characteristic of each class.

7. What is a torpedo, and how is it used in warfare?

8. Give some account of the local government of your town or county. How are the members elected?

Test Questions.

1. Write as specimens of copy-setting:—
   Large Hand.—*Experimentally.*
   Small Hand.—*Revenge is a kind of wild justice.*

2. Write the following in Staff Notation:—

KEY A.

$\{|s:1:s.f|m.f:s:d'|t:-.1:s.1|d':t:-|s:m.d:s|f:r:d.\|$

3. Write explanatory notes on the following: Born under Saturn; a very forward March chick; a cinque-pace; my visor is Philemon's roof; "Hundred Merry Tales."

4. Describe the origin and nature of the British occupation of Egypt.

5. Mention six great manufacturing centres in Europe, and give a detailed account of two of them.

6. Point out any acts of Henry the Second which weakened the Feudal System.

7. What is meant by Poitevins, Provençals, Mise of Amiens, justiciar, Papal legate?

8. Work the following:—

(*a*) Five per cent. on a given sum yields £3·77083; give $5\frac{1}{2}$ per cent. on half the sum. Ans. £1, 19s. $7\frac{1}{2}$d.

(*b*) If two clocks, one of which gains two minutes and the other loses four minutes a day, be set at noon, what hour will the second indicate when the first indicates noon twelve days afterwards? Ans. 48 min. $57\frac{1}{11}$ sec. past 10 a.m.

(*c*) If 8 decalitres 3 litres 4 decilitres 7 centilitres of wine cost 584 francs 29 centimes, what will be the cost of 1 hectolitre 1 decalitre 2 litres 9 decilitres 3 centilitres at the same rate?
Ans. 790 francs 51 centimes.

(*d*) If a tradesman by selling an article at 8s. 3d. loses $17\frac{1}{2}$ per cent., what should he have sold it for to gain 40 per cent.?
Ans. 14s.

9. Describe exactly the way to make a mercury thermometer. Convert 35° Centigrade into Fahrenheit, and 77° Fahrenheit into Centigrade and Reaumur.

10. A jug of hot water stands on a table. Explain exactly how it loses its heat.

PUPIL TEACHERS' COURSE.

For Candidates' Examination, 1904.

As the examination is deferred till May, candidates will have another month for revision of their work. The more important points have been dealt with in the course. The following questions will serve for practice and revision:—

Last Year's Papers.

1. *Arithmetic.*—(1.) A merchant buys 3,600 metres of cloth in France at 18·75 francs per metre. He could have purchased the same quality of cloth in England at 14s. 6d. per yard. Find the difference in the cost of the cloth in France and England, either in French or English money (1 metre = 39·37in.; £1 = 25 francs).

(2.) If 6 men and 2 boys build a wall in 27 days, in how many days will 27 men and 9 boys build it?

(3.) Find the value of 1,366 ounces of gold at £3, 17s. $10\frac{1}{2}$d. per ounce, by practice in the ordinary way, or by subtraction to reduce labour.

(4.) Find the value of $(3\frac{1}{2} + \frac{1}{3} + \frac{1}{10})$ of £12, 13s. 4d. by method of practice.

(5.) What fraction is $\left(\text{£2, 15s.} - \text{18s. 8d.} \times \frac{3 \text{ lbs. } 12 \text{ oz.}}{2\frac{1}{2} \text{ cwt.}}\right)$ of $\left(\text{£9, 10s.} + \text{3s. 10d.} \times \frac{3 \text{ weeks } 4\frac{1}{2} \text{ days}}{23 \text{ hours}}\right)$?

2. *Geography.*—(1.) Name the most important seas and gulfs which form part of the Atlantic Ocean, and name the countries whose shores they respectively wash.

(2.) Name and give the general direction of the chief rivers in Asia, and give the reason for the direction which each river takes.

(3.) Name four important towns or centres of industry in England, two in Scotland, and one in Ireland, and give the reasons for the growth of these places.

(4.) Give the position and write a few words about the following places—Bath, the Cotswolds, Ely, Stonehenge, Llandudno, Oban, Fort Augustus, Peterhead, Lough Corrib, Bray, Westport.

(5.) Give the population approximately of England, Scotland, and Ireland, and state what you know as to the increase or decrease in such population.

(6.) Compare and contrast the chief physical features of North and South America.

3 *Science.*—(1.) A test tube is weighted with shot so that it will float about three-quarters immersed in water. How will it behave if placed (*a*) in strong brine, (*b*) in alcohol, (*c*) in mercury ?

(2.) A triangle is cut out of cardboard. Draw a figure to show how it will hang (*a*) when suspended by a thread fastened at one of its corners, (*b*) when suspended by a thread fastened to the middle point of one of its sides.

(3.) A rod is 4 feet long and weighs 8 lbs. A weight of 12 lbs. is hung from the middle of it, and a weight of 10 lbs. from one end. The rod is balanced on a nail. How far must the nail be from the end ?

(4.) A truck which runs on a tram line is drawn by a horse. Explain why, unless the horse pulls in a particular direction, part of its strength is wasted. Illustrate your answer by a diagram.

(5.) About what height does the barometer generally stand ? How does the reading of a barometer at the top of a mountain differ from the reading of a barometer at the bottom ? How do you account for the difference ?

1902 Questions.

1. *History.*—(1.) What do you know of any three of the following: King Alfred, Bede, Simon de Montfort, John Wycliffe, Cardinal Wolsey, the Duke of Wellington ?

(2.) Give an account of either (*a*) the Crusades or (*b*) Monmouth's insurrection, or (*c*) the American War of Independence.

(3.) Name the Tudor sovereigns. What great geographical discoveries were made by Englishmen during their reigns ?

(4.) Why was the Armada sent against England ? Give an account of the expedition.

(5.) Give a short account of (*a*) the conquest of Canada, or (*b*) the Indian Mutiny.

2. *Arithmetic.*—(1.) What do you understand by a decimal fraction ? Find the value of $\frac{7}{10^3} + \frac{5}{10^2} - \frac{8}{10^3} + \frac{17}{10^{6000}}$, and express the result as a decimal of 120.

(2.) A grocer mixes 11 lbs. of tea at 2s. 6d. with 15 lbs. at 1s. 10d., and 14 lbs. at 4s. 2d. If he sells the whole at 3s. per lb. what does he gain per lb., and what is his total gain ?

(3.) A town is provisioned for six weeks, its population being 20,000. How many people must leave in order that the provisions may last for eight weeks ?

(4.) Three bottles of champagne and five bottles of Bordeaux cost as much as five bottles of champagne and one of Bordeaux. If a bottle of champagne costs 11 francs 30 centimes, what will be the cost of a bottle of Bordeaux ?

(5.) A snail starts on the 1st of June to climb a wall at the rate of 2 feet per day, but during each night he slips down 18 inches while he sleeps. If the wall be 12 feet high, on the evening of what day will he first reach the top ?

(6.) Find what must be paid to 721 labourers for 7 weeks' work at 17s. 4½d. per week each.

3. *Geography.*—(1.) What are the causes of ocean currents ? Name and briefly describe the most important of them.

(2.) Describe the basin of either (*a*) the Yorkshire Ouse, or (*b*) the Tweed, or (*c*) the Wye, illustrating your answer by a sketch map.

(3.) Where are the following, and why are they of interest: Stirling, Grimsby, Sedgemoor, Londonderry, St. Michael's Mount, Bantry Bay ?

(4.) Name six of the most important mountain ranges of the world, giving their position and direction.

(5.) From which parts of the British Isles do we procure slate, tin, fish, hops, butter, linen goods, carpets ?

4. *Science.*—(1.) What do we mean when we say that the specific gravity of mercury is 13½? What things are necessary for the experimental determination of this specific gravity ? Say how you could proceed to make the determination.

(2.) Part of a chain rests on an inclined plane, and the remainder hangs over the back. Draw a diagram to show in what position the chain will rest if the plane is so smooth that friction need not be taken into account. Give any explanation you think necessary.

(3.) As two ships pass in opposite directions, a person on one of them throws a ball to a person on the other. How must he aim ? Draw a diagram to explain your answer.

(4.) A weight, which is hung by means of a piece of elastic from a nail in the ceiling, is pulled some way to one side by a thread which is always kept horizontal. Explain why this operation will increase the stretching of the elastic. Illustrate your answer by a diagram.

(5.) What do you know about the contents of that part of the barometer tube which is not filled by the mercury ? What simple experimental proof of the truth of your answer can be given ?

Answers to arithmetic above.

1903. (1.) £15, 8s. 7·8d. (2.) 6 days. (3.) £5,318, 17s. 3d. (4.) £46, 4s. 8d. (5.) $\frac{7}{15}$.

1902. (1.) ·0023475. (2.) 4d.; 13s. 4d. (3.) 5,000. (4.) 5 fr. 65 cent. (5.) £4,384, 11s. 7½d.

New Second Year Course.

Pupil teachers who have just completed their First Year Course should commence at once on the Second Year's work. This will be arranged to cover all the ground by the end of December, so that a clear year may be left for Scholarship. As there will be no examination to pass at the end of the year, the course will be arranged as far as possible to lead on to and prepare directly for the Scholarship work.

1. *Reading.*—For special study in this subject I should recommend one or two of Macaulay's Essays (say *Lord Clive* and *Warren Hastings*), together with one of Scott's Waverley Novels (say *Rob Roy*). These are published in cheap annotated editions. The best cheap edition of the Waverley Novels is A. and C. Black's. While these books receive special study, as many others must be read as time will permit. I shall be pleased to send a list of suitable books to any one who cares to apply for it.

2. *Repetition.*—This should be selected from the special English poem studied, but it is a great mistake to limit this exercise to 100 lines of any poem. There are numerous gems in English literature, consisting of short passages, which should be committed to memory. Palgrave's *Golden Treasury of Songs and Lyrics* (Messrs. Macmillan and Co.) will supply an ample stock to select from.

3. *Penmanship.*—This requires continual care. Practice from a *good model* is essential. Get the *Practical Teacher Copy Book* (Nelson and Sons), specially written for pupil teachers, and containing all that is necessary for a year's work.

4. *Drawing.*—A start should be made with freehand drawing, and one or two copies should be drawn each week.

5. *English.*—For special and detailed study take Goldsmith's *Traveller*. There are many cheap annotated editions of this poem. That by Ralph Holland, interleaved, is very suitable. For this month prepare the first 50 lines. Be prepared to analyse and paraphrase the whole and to parse any word. In grammar, learn 15 roots and meanings each week. A list will be found in your text-book. The *Pupil Teacher's Notebook* (Nelson and Sons) contains a suitable collection, together with many other essential points—for example, a brief history of the language, common errors in speech, etc. Prepare also the grammar of the noun. Note particularly exact definitions of all terms employed, methods of forming plurals and feminine gender, the various kinds of case.

6. *History.*—The reigns of James the First and Charles the First.

Chief points.—James the First.

(*a*) James's descent. Learn a genealogical table, showing his relation to the Tudors and Arabella Stuart.

(*b*) The plots against him, and the causes.

(*c*) The Hampton Court Conference.

(*d*) The growing power of the Puritans in the Commons.

(*e*) James's character, his theory of "Divine Right," etc. Read Scott's *Fortunes of Nigel*.

(*f*) Plantation of Ulster.

Charles the First.

(*a*) Character compared with that of his father.

(*b*) The three early Parliaments—Petition of Right.

(*c*) The eleven years of personal rule. Life of Laud and Strafford.

(*d*) The Short Parliament. The Long Parliament.

(*e*) The immediate causes of the outbreak of the Civil War.

(*f*) The course of the war.

(*g*) The period of captivity and death.

This is a very important period, and will require careful study. Prepare answers to the following questions :—

(1.) How did Charles obtain money between 1629 and 1646 ?

(2.) Give an account of the attempt to introduce a Liturgy into Scotland, and its results.

(3.) How do you account for the success of the Parliament in the war ?

(4.) What were the following—Grand Remonstrance, Pride's Purge, National Covenant, Solemn League and Covenant, Instrument of Government, Presbyterians, Independents, Levellers ?

(5.) Explain the action taken by the Scots in the war.

(6.) Give an account of what took place between Charles's surrender, 1646, and his death, 1649.

(7.) Explain clearly the various religious parties in the time of the early Stuarts.

OUR CERTIFICATE COURSE FOR 1904.

BY GEORGE COLLAR, B.A., B.SC.,
Head-master of the Stockwell Pupil Teachers' School.

TEST QUESTIONS ON LAST MONTH'S WORK.

THEORY OF TEACHING.

1. WHAT steps would you take to prevent copying in the arithmetic class?
2. Describe the different stages in teaching division, and say what points should specially be insisted on in order to prepare the way for teaching division of decimals.
3. Give a list, with short notes, of Froebel's "Means of Education."

ENGLISH LANGUAGE AND LITERATURE.

1. What are the chief characteristics of the poetry of the eighteenth century? Illustrate your answer by quotations from the *Golden Treasury*.
2. Compare the poetry of Collins with that of Gray.
3. Name the authors of the following extracts, and show by further quotation or reference to the context that you are acquainted with the poems from which they are taken:—

(*a*) "It was not in the battle;
No tempest gave the shock;
She sprang no fatal leak,
She ran upon no rock."

(*b*) "What female heart can gold despise?
What cat's averse to fish?"

(*c*) "Happy the man whose wish and care
A few paternal acres bound,
Content to breathe his native air
In his own ground."

(*d*) "Where ignorance is bliss,
'Tis folly to be wise."

(*e*) "Ye flowery banks o' bonnie Doon,
How can ye blume sae fair!
How can ye chant, ye little birds,
And I sae fu' o' care!"

(*f*) "How sleep the brave, who sink to rest
By all their country's wishes blest!"

(*g*) "The day is aye fair
In the land o' the leal."

ENGLISH HISTORY.

1. Write a short life of Robert Walpole. Explain in detail the principle of the Excise Bill, and say why it was withdrawn.
2. Give an outline of the American War of Independence, and show the influence of naval power in determining the result.

GEOGRAPHY.

1. Write a few notes on the discovery and settlement of the different parts of America.
2. Compare the three great river basins of South America.
3. What are the chief facts connected with the climate of North America? Account for them as far as you can.

ARITHMETIC.

1. A man invests the present worth of £5,556, due 4½ years hence at 3½ per cent. per annum, simple interest, in 4 per cent. railway debentures at 125. What income does he obtain?
2. If I sell out 2½ per cent. stock at 93¼, and buy 3 per cents. at 101¼, and by this transaction increase my income by £11, 10s. a year, how much had I in the 2½ per cents. at first (allowing ¼ per cent. brokerage on each sale)?

EUCLID.

1. Given the hypotenuse of a right-angled triangle, and the point in which it is cut by the bisector of the right angle, construct the triangle.
2. Show how to construct a regular pentagon, having given the length of the line joining two angular points which are not adjacent.

ALGEBRA.

1. Simplify $\left(\frac{x+a}{x-a}+\frac{x-a}{x+a}\right)\div\left(\frac{x+a}{x-a}-\frac{x-a}{x+a}\right)$.
2. If $2s = a + b + c$, obtain the value of the following in terms of a, b, and c.
$s^2+(s-a)^2+(s-b)^2+(s-c)^2+s(s-a)+(s-b)(s-c)$.
3. Divide a number N into three parts, such that one-third of the number exceeds the first part by as much as the second part exceeds one-fourth of the number.

ELEMENTARY SCIENCE.

1. Describe the chief differences between "arterial" and "venous" blood.
2. Write a short comparative account of the organs of circulation in some of the leading types of the animal kingdom.

NOTES AND SYLLABUS FOR APRIL.

ENGLISH COMPOSITION.

Write essays on the following:—
1. The causes of the war in the Far East.
2. "Fear to do base, ignoble things is valour.
If they be done to us, to suffer them is valour too."
3. "Our sweetest songs are those that tell of saddest thought."

THEORY OF TEACHING.

Finish the chapter on the teaching of arithmetic. This part of the work requires a sound knowledge of the principles of the subject itself; for although no one can be said to know much about arithmetic who does not understand the theory well, it is a matter of absolute necessity for a teacher to be a master of this part of the subject.

In the higher parts of arithmetic, and indeed all through the subject, the mistake is too frequently made of regarding the work as consisting of so many distinct and disconnected "rules." The golden principle of "proceeding from the known to the unknown" is generally ignored. But, as a matter of fact, arithmetic is greatly simplified if the "rules" are put more into relation with one another. Operations with whole numbers and with fractions must be regarded as closely allied; decimal fractions must be regarded as merely an extension of the decimal arrangement used in notation of whole numbers; proportion should be taught as an extension of operations with vulgar fractions; while nearly all the succeeding rules—interest, discount, profit and loss—are merely applications of proportion.

We should like to direct the student's attention to the series of papers in this magazine entitled "Practical Help in the Arithmetic Lesson."

ENGLISH LANGUAGE AND LITERATURE.

Study the fourth book of the *Golden Treasury*. This covers the poetry of the nineteenth century, a period which had many marked characteristics. It was ushered in by Wordsworth, Coleridge, Southey, and Campbell—a group generally known as the "Lake Poets," from the fact that some of them resided among the English Lakes, and drew their inspirations from the scenery of those parts. At first they exhibited a tendency to go in for political subjects, and welcomed the French Revolution as a great movement in the cause of freedom; but finding that under Napoleon the First the Revolution had only substituted one form of tyranny for another, they sided with the Conservatives, and used their talents in support of those who opposed Napoleon. Hence we get the patriotic songs in the collection—*Ye Mariners of England*, *The Battle of the Baltic*. The stirring battle times called forth such martial poems as *Hohenlinden* and the *Burial of Sir John Moore*. But their chief themes were drawn from nature, and the student should read Wordsworth's *Lines Composed a few Miles above Tintern Abbey*, in which he sets out his views and feelings thus:—

"The sounding cataract
Haunted me like a passion; the tall rock,
The mountain, and the deep and gloomy wood,
Their colours and their forms, were then to me
An appetite, a feeling and a love,
That had no need of a remoter charm,
By thought supplied, nor any interest
Unborrowed from the eye.....
....I have felt
A presence that disturbs me with the joy
Of elevated thoughts; a sense sublime
Of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean and the living air,
And the blue sky, and in the mind of man:
A motion and a spirit, that impels
All thinking things, all objects of all thought,
And rolls through all things. Therefore am I still
A lover of the meadows and the woods,
And mountains, and of all that we behold
From this green earth."

CLOUGH'S
Correspondence College
TEMPLE CHAMBERS, LONDON, E.C.

KING'S SCHOLARSHIP EXAM., Dec. 1903.

REMARKABLE RESULTS.

Mr. READER W. BULLARD, 9 Sylvester Road, Walthamstow, was a Student of Clough's Scholarship Class commencing Jan. 2nd, 1903, for the Full Course, and is placed in

Division I. of the First Class.

He therefore wins a

SCHOLARSHIP OF £100,

as promised in Clough's Scholarship Prospectus.

This is the **second year in succession** that a Student of Clough's Scholarship Class has been placed in **Division I.** of the **First Class,** this distinguished position being taken last year by **Mr. G. S. BLAKE,** 5 Glendale, Cornwallis Crescent, Clifton, Bristol.

Thus on no less than three occasions have Students of Clough's Scholarship Class

HEADED THE LIST.

Other successful Students of the December 1903 Class include:—

Miss E. J. SUTTON, 27 Richard Street, Llanelly, who is placed in **Division II. of the First Class,** and who therefore, in accordance with the Prospectus, wins a

SCHOLARSHIP OF £50.

Mr. S. E. R. STARLING, 23 Magdalen Road, Norwich, who is placed in **Division II. of the First Class,** and who therefore, in accordance with the Prospectus, wins the other

SCHOLARSHIP OF £50.

The following Students are placed in **Division III. of the First Class,** and accordingly win **Prizes of £10 each:—**

Mr. J. W. BIRT, 54 Cowley Road, Oxford.
Mr. A. E. CHAPMAN, 116 Greville Road, Southville, Bristol.
Mr. LOUIS W. La CHARD, 51 Powerscourt Road, North End, Portsmouth.
Miss C. M. M'GRATH, 95 Standishgate, Wigan.
Miss IRENE MANTEGANI, St. Thomas's and St. William's School, Liverpool.
Mr. H. J. STOCKER, 2 John Street, Tiverton.

Over 200 other FIRST CLASS Successes already ascertained.

A New Section of Clough's Scholarship Class for December 1904 is now commencing. Every Scholarship Student who wishes to do well should join this Class. To secure admission immediate application is necessary.

For Prospectus, Plan, Terms, Entry Form, etc., application should be made at once to—

Mr. G. B. CLOUGH, Temple Chambers, London, E.C.

These lines are well worth committing to memory, for they give the keynote to the movement of poetry at the opening of the last century. They show how poets learned to look on nature, and they explain the existence of such poems as the *Lesser Celandine*, *The Cuckoo*, and the odes to the *Nightingale* and the *Skylark*. There is always a danger when a poet enunciates a theory and puts forth a manifesto. He is led to write in order to support his theory, and frequently runs into excess; and although Wordsworth gives us some beautiful little poems on little subjects drawn from nature, yet he frequently spins them out till we feel that he becomes trivial—for example, *Peter Bell*, *The White Doe*, and the *Kitten and the Fallen Leaves*. The eighty lines on the last subject simply make one yawn.

Coleridge gave promise of great things by his early poems, which he did not fulfil later on. One of his critics said he might have been the greatest among poets if he had not been the most indolent. Southey belongs to the Lake School, but he drew many of his subjects from historical sources—*After Blenheim*, in our collection; among his longer works, the *Curse of Kehama*, *Madoc*, *Thalaba*, *Joan of Arc*, and *Roderick, the last of the Goths*. We cannot go into particulars of the longer poems, and the shorter ones speak for themselves if the student looks at them in the right light.

Lord Byron was a poet whose work shows great extremes. The lyrics in our collection are the very perfection of melodic verse. His subjects were largely autobiographical. Shelley was a close friend of Byron, and resembled him in many ways, particularly in his opposition to established customs. For his subject matter he dealt largely with metaphysics, and in his forms he is much indebted to Gray's odes.

The poets of the Lake School and Byron had a very marked influence on French poetry.

English History.

Study the period from 1783 to 1837. The American Revolution had been brought to a close by the Treaty of Paris, or of Versailles. The battle of Saratoga was the event that decided the War of American Independence; for when Cornwallis was invested by the Colonists on land and by the French fleet at sea, he had no other course open but to capitulate. Rodney's great victory over the French in the West Indies restored the maritime supremacy of Great Britain; but it came too late to prevent the independence of the United States, though, no doubt, it made the demands of France and Spain less exacting than they otherwise would have been. France, however, obtained Chandernagore, Pondicherry, Karikal, Mahé, and Surat in India, Tobago and St. Lucia in the West Indies, and Senegal in Africa.

The history of the extension of British power in India should be studied in detail. This forms a subject by itself.

The history of England at this period cannot be properly understood without taking up the study of the French Revolution. We will endeavour to give a short summary of the chief points of this movement.

Although the apparent cause of the outbreak of the Revolution was the financial difficulty, or lack of money, the real cause was the difference between the existing state of affairs and the ideas of politics and of society that had been set up. In France the feudal system had survived, but in a one-sided fashion—that is, the poor felt all the disadvantages, with practically no compensating advantages. They were obliged to pay parts of their harvest, or vintage; to refrain from selling their crops during certain periods, so that the lord might have no competitors in disposing of his; to allow their crops to be destroyed by their lord's horses and dogs in "the chase;" to allow the pigeons from the manor-house to feed on their corn; and to pay a heavy tax when they drove their sheep or cattle along the road, on the pretext that the land of the lord was injured by the dust so raised. The system of *lettres de cachet* enabled the king to send persons to prison without trial. The minds of people had been aroused by the works of such writers as Voltaire, Montesquieu, Rousseau, and Beaumarchais. Louis the Sixteenth had, however, two able ministers to direct his finances—Turgot and Neckar; but in their endeavours to keep down the expenses, they raised many enemies at court, and so fell one after the other. After drifting into further financial difficulties, the king recalled Neckar, and, acting on his advice, assembled the States-General. This Assembly consisted of three parts, the nobles, clergy, and commons; and although the representatives of the people were the most numerous, they had a great preliminary struggle before they could make their influence felt. The States-General had not met since 1614, and when they assembled on May 5, 1789, the question arose whether they should vote by orders, or as individuals—that is, should a proposition be carried by a majority of houses, or of men. The former had been the plan before, but the reformers felt that the nobles and clergy would be sure to oppose any proposals which would curtail their privileges; hence they insisted, and the king was obliged to give way, June 27th. This was the point at which the people triumphed. On July 14th the people of Paris rose and captured the Bastille, and in the provinces the people prepared to attack the feudal castles, so the Assembly on August 4th abolished all feudal privileges. Louis accepted these reforms with bad grace, and on October 5th an armed crowd marched to Versailles, and compelled him to accompany them back to Paris; the Assembly followed the king.

The celebrated *Declaration of the Rights of Man* was voted by the Assembly on August 23, 1789; and we may here call attention to a point of difference between the French Revolution and revolutions that have taken place elsewhere. When Englishmen and others have rebelled against tyranny, they have generally been content to obtain charters which guaranteed the liberties of their own countries; but the French declared that they were "working for humanity," and hence, not only was the Declaration quite general, but trouble was caused later on by the French trying to introduce these principles into other countries. The nobles, who had lost the privileges they formerly enjoyed, went abroad and strove to find help in other countries. This exasperated the people. In 1790 Louis the Sixteenth swore to respect the new constitution, but all the time he was negotiating for foreign intervention. On June 20, 1791, he attempted to leave Paris and go to Metz, where some troops had been raised for him. He was captured at Varennes, and brought back to Paris. From that time his power was gone. War broke out with Austria and Prussia, and France was invaded. At first the French suffered nothing but reverses, but the tide turned when the Duke of Brunswick was defeated at Valmy (September 20, 1792). The next day France was declared a republic, and on January 21, 1793, Louis was executed. Up to this time Pitt had maintained peace with France; but in their desire to spread political reform, the French invaded Holland, in order to drive out the reigning prince. According to the terms of our treaty with Holland, Pitt was then obliged to declare war against France. The Duke of York landed with an army, and besieged Dunkirk; but he was obliged to retire, and the French, driving the English steadily before them, took Amsterdam, January 20, 1795, and captured the Dutch fleet in the Texel. They were unable to use it, for Admiral Duncan blockaded it; and when it left port in October 1797, he defeated it at Camperdown.

Arithmetic.

We shall this month deal with some of the questions set in last year's arithmetic paper, as types of the methods of solving such problems.

1. Work the following as shortly as possible, showing your method clearly:—

(*a*) 6782×999.

Since $999 = 1000 - 1$, the quickest way to make the calculation is to take 6782 from 6782×1000.

Thus $6782 \times 999 = 6782000 - 6782 = 6775218$.

(*b*) $578{\cdot}45 \times 16{\cdot}\dot{6}$.

$16{\cdot}\dot{6} = \frac{1}{6}$ of 100, so we take $\frac{1}{6}$ of 100 times 578·45.

$57845 \times \frac{1}{6} = 9640{\cdot}8\dot{3}$.

(*c*) 799 articles at $7\frac{1}{2}$d. each.

That is one less than 800 articles at £$\frac{1}{3}$ each.

800 articles cost £$\frac{800}{32}$ = £25.

∴ 799 cost £24, 19s. $4\frac{1}{2}$d.

(*d*) Find the cost of goods upon which, by selling at a gain of $2\frac{1}{2}$ per cent., I clear £60.

$2\frac{1}{2}$ per cent. of cost = $\frac{1}{40}$ of cost = £60.

∴ cost = £60 × 40 = £2400.

(*e*) Find the *total* cost of—

136 yards of calico at $6\frac{1}{2}$d. per yard.

16 yards of silk at 4s. $5\frac{1}{2}$d.

As *total* is printed in italics, the examiner evidently expected the student to see a shorter way of obtaining it than by finding the two items separately, and then adding them together. Probably the majority of students would spend more time in discovering the special method than in working the question by actual multiplication. The shortest method, *if you see it*, is to take 16 yds. at $6\frac{1}{2}$d. and 16 yds. at 4s. $5\frac{1}{2}$d., which comes to ($6\frac{1}{2}$d. + 4s. $5\frac{1}{2}$d.) × 16; 5s. × 16 = £4. Then 120 yds. at $6\frac{1}{2}$d. per yd. cost £3, 5s., since $6\frac{1}{2}$d. × 120 = 120d. × $6\frac{1}{2}$, and 120d. = half a sovereign. ∴ Total cost = £7, 5s.

(*f*) Evaluate $\sqrt{(50{\cdot}72)^2 - (48{\cdot}28)^2}$.

Remembering that $a^2 - b^2 = (a + b)(a - b)$, we write it

$$\sqrt{\{50{\cdot}72 + 48{\cdot}28\}\{50{\cdot}72 - 48{\cdot}28\}}$$

$$= \sqrt{100 \times 1{\cdot}44} = \sqrt{144} = 12.$$

(*g*) Multiply 2 tons 2 cwt. 2 lbs. by 2241. This is the same

Some Notes on School Books.

A LOOK INTO MESSRS. BLACKIE'S LIST.

Nature Study.

Nature Study, under one name or another, has always been a favourite subject in the Junior School; but recent developments are causing it to be taken up in all the Standards. To meet this development the Nature-Study Course of **The Newton Science Readers,** which hitherto has finished with the third book, is now carried on to Standard VI. Accordingly, the Rev. Theodore Wood's books, "OUR FRIENDS AT THE FARM" (Standard IV.) and "ANIMAL AND PLANT LIFE," Parts I. and II. (Standards V. and VI.), revised and equipped with a set of beautiful natural history pictures in colour, are incorporated in this series so as to form a reasonably complete course of natural history lessons. Grouped together into a new, connected course, the volumes will, it is hoped, meet the needs of the large number of schools in which "Nature Study" is now taken up throughout the school. The Science books in the Newton Series are "THE YOUNG MECHANICS" (Standard IV.), "THE YOUNG CHEMISTS" (Standard V.), "LESSONS ON LIVING" (Standard VI.).

New History Readers.

To meet the varying demands of schools in the subject of History, Messrs. BLACKIE AND SON have issued a new series of Concentric History Readers, and are issuing a new series of Periodic Histories. The first of these series, entitled "THE COMPLETE HISTORY READERS," consists of six volumes, the first two being *Stories from History*. The third is a simple introduction to the subject, covering the whole course of History in a connected series of lessons. The remaining three books traverse and re-traverse the whole range of British History in successive courses, in broad, picturesque outlines to begin with, the outlines being gradually filled in with detail as advanced standards are reached. The series is an excellent one in every respect, and teachers are recommended to write to Messrs. Blackie and Son for particulars regarding it.

The second series, Blackie's "NEW PERIODIC HISTORIES," is designed to meet the wants of those who prefer to teach History on the periodic plan. Several schemes of Periodic History teaching have appeared in the Code, but all of these presume that the pupils will remain at school until they have passed Standard VII. There was obviously a need of a series of History Readers which would complete the entire course in Standard VI. Such a course is provided in this new series. The first three books are the same as those in THE COMPLETE HISTORY READERS detailed above. Standard IV. begins the connected periodic course, and deals with English History from early times until the discovery of America. Standard V. proceeds from the discovery of America to the Battle of Waterloo. Standard VI. continues the history down to the present day, and is entitled *The British Empire in the Nineteenth Century*. While nominally beginning after Waterloo, this book has a series of chapters on the earlier events of the nineteenth century; and in Colonial history, to which it devotes much attention, it harks back to the loss of the American Colonies and the beginnings of British rule in India. It thus forms not only a complete History of the Nineteenth Century, but a complete History of the Growth of the British Empire.

A New School Dictionary.

A remarkable volume for the money has recently left the press, under the title of **Blackie's Standard Shilling Dictionary.** While compact, it is full and reliable in its definitions. It contains a large vocabulary, and to the definitions there are added *pronunciation, irregular forms of verbs, peculiar plurals of nouns,* etc. A notable feature is the practically useful nature of the Appendices. These consist of useful lists of various kinds—*e.g.* Foreign Words and Phrases; Abbreviations and Contractions; Forms of Address; Moneys, Weights, and Measures; Terms used in Physics, Chemistry, Civil and Electrical Engineering; and a *pictorial description* of the most important Mechanical Movements. *The price of the book is not net.*

Commenting upon this book, the *Schoolmaster* says:—

> "A marvel of cheapness. Fancy a book of this type, consisting of four hundred and forty-eight pages, for a shilling! Why, the forty pages of appendices are worth it. Every boy and girl in the upper classes of our schools should possess a copy."

Brush-Drawing.

The attention of all teachers taking up Brush-Drawing is specially directed to the latest publications on this subject by Mr. Nicol of Bradford, who brings to his aid an extensive practical experience with pupils at all stages of advancement. The **Brush-Drawing Sheets** (three sets) are eminently suited for the purposes of Class Demonstration. They are beautifully coloured, carefully graduated, and pleasantly varied. The **Brush-Drawing Cards** (three sets) are intended to be used either with or after the Sheets. The Exercises are based on the elements taught in the Sheets, and nothing finer could be put into the hands of the pupils. Last on the list is **Brush-Drawing** (7s. 6d. net), the Handbook for Teachers, which has, by the beauty of its numerous plates, its perfect graduation, its valuable notes, hints, etc., already been brought into very general favour.

Geographies.

There can be no question that the **New Century Geography Readers** are the brightest and best Geographies that have ever been produced. Already the series has won its way into most of the leading schools both in London and in the provinces. There is an old saying that the proof of the pudding is the eating. In the case of these Readers the manifest results which have followed their use provide striking evidence of their excellence and worth. In the early numbers Geography is taught through Object Lessons in Elementary Science. The books are written in bright descriptive language, and are very fully illustrated by a series of beautifully-coloured pictures, as well as by many black-and-white pictures, maps, and plans.

Book III. deals with *Industrial England*, and Books IVc., V., and VI. treat respectively The British Isles, Europe, and The British Empire.

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as 2241 tons × 2, + 2241 cwt. × 2 + 2241 lbs. × 2, that is 4482 tons + 224 tons 2 cwt. + 2 tons 2 lbs.

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2. A rectangular field, the ratio of whose length to its breadth is 5 : 3, contains 13 acres 2 roods. How long will it take a man to run round the boundary at the rate of 12 miles an hour?

If the field be increased by 4 acres 2 roods, the breadth remaining unaltered, at what rate does a man run round it in 52 seconds longer than was occupied in running round the first field?

The field can be divided into 15 squares, each containing $\frac{13 \text{ ac. } 2 \text{ roods}}{15} = 144$ sq. perches, and having ∴ 12 perches in each of their sides. ∴ the field is 60 perches long and 36 perches wide. The four sides total up to 192 perches.

The time taken will be $\frac{192 \text{ perches}}{12 \text{ miles}}$ of 1 hour.

$\frac{192}{12 \times 8 \times 40}$ of 60 min. = 3 min.

The new piece will be a rectangle 4 ac. 2 roods in area and 36 perches long (that is, the same as the width of the field). Its width is therefore $\frac{18 \times 40}{36}$ per., or 20 per. Consequently the perimeter of the field is increased by twice this. If the man takes 52 seconds to run 40 perches, he runs at the rate of $\frac{60 \times 60 \text{ secs.}}{52 \text{ secs.}}$ of 40 perches per hour.

Ans. 8 m. 5 fur. $9\frac{5}{13}$ per. per hour.

3. Four tons can be carried 300 miles by rail for £14, 11s. 8d., the rate per ton per mile for the second 100 miles being half of the initial rate, and for the third 100 miles a quarter of the initial rate. How far can 9 tons 12 cwt. be carried for £31, 15s.? The rates are as $1 : \frac{1}{2} : \frac{1}{4}$, or as 4 : 2 : 1, ∴ the carriage for the first 100 miles is $\frac{4}{7}$ of the total.

$\frac{4}{7}$ of £14, 11s. 8d. = £8½.

∴ $9\frac{3}{4}$ tons could be carried 100 miles for $\frac{9\frac{3}{4}}{4}$ of £8½—that is, $\frac{39}{16}$ of £$\frac{17}{2}$, or £20.

It could be carried another 100 miles for half this—that is, £10. The third 100 miles would have cost £5, but as only £1, 15s. more was actually paid, the extra distance was only $\frac{13}{4}$ of 100 miles—that is, 35 miles. Ans. 235 miles.

4. One hundred students present themselves for an examination in modern languages. Each student must take at least two of the three languages—French, German, and Italian—and it is found that 80 students present themselves in French, 70 in German, and 60 in Italian. How many students present themselves in all three languages?

This is a very simple question indeed. The working is as follows—80 + 70 + 60 − 2 × 100 = 210 − 200 = 10. Answer 10. No explanation is asked for, but it might be given as follows:—

Suppose the French papers served out first, then 20 of the German papers will suffice to give the candidates one each. The remaining 50 German papers can be given to students who already have a French paper. The Italian papers can be distributed to the remaining 30 with French papers and the 20 with German papers, leaving only 10 in hand after everybody has two papers. These must be given to some of the 50 who already have papers in French and German.

5. A wall 5 feet high and 13½ inches thick is built round the two longer sides and one end of a rectangle 6 feet by 12 feet. Find the number of bricks needed for this wall, if each brick is 9 inches long, 4½ inches wide, and 3 inches thick.

The wall consists of three sections, two 12 ft. long and one (6 ft. + 13½ in. × 2) in length. Total length = (12 × 2 + 6 + 2½)ft. = 32½ ft. = 43 times the length of a brick; the thickness = three times the width of a brick; and the height = 20 times the thickness of a brick.

∴ total number required = 43 × 3 × 20 = 2580.

Ans. 2580 bricks.

Algebra.

The following questions were set last year at the Certificate Examination:—

1. If p is a positive integer, find the value of p, so that $x^4 - px^3 + 5x^2 - 2px + 4$ may be a perfect square.

A study of the form of a square such as $a^2 + 2ab + b^2$ teaches us that if we take away a part of this which is itself a square—namely, a^2—the remainder will consist of the product of the second part of the root by the sum of twice the root of the part subtracted and the new part, $b(2a + b)$. In the example given, subtract $x^4 + 4x^2 + 4$, which is the square of $x^2 + 2$; then the remainder $-px^3 + x^2 - 2px$ will be equal to $b(2x^2 + 4 + b)$, in which b is the remaining term of the root.

$$2x^2 + 4 - \frac{px}{2}\Big) -px^3 + x^2 - 2px \Big(-\frac{px}{2}$$
$$-px^3 + \frac{p^2x^2}{4} - 2px$$
$$x^2 - \frac{p^2x^2}{4}$$

Taking $2x^2 + 4$ as the trial divisor, and working out the next step in the extraction of the square root, we have the remainder $x^2 - \frac{p^2x^2}{4}$; that is, $x^2\left(1 - \frac{p^2}{4}\right)$. Now, if the original expression is a perfect square, this remainder must equal 0. This will be the case if either of its factors x^2 and $\left(1 - \frac{p^2}{4}\right)$ is equal to 0. If $x^2 = 0$, the whole expression is equal to 4, because every term involving x will vanish; and since 4 is a perfect square, it follows that if $x = 0$, the expression is a perfect square for every value of x. But if x is not equal to 0, then $1 - \frac{p^2}{4} = 0$; that is, $p^2 = 4$. ∴ $p = \pm 2$.

Ans. If x is not equal to 0, p must equal ± 2.

2. Show that any ratio is made more nearly equal to unity by adding the same positive quantity to each of its terms. Hence explain clearly how to place in order of magnitude the fractions $\frac{3}{5}$, $\frac{4}{7}$, $\frac{5}{9}$.

Let $a : b$ be the given ratio, and let $a = b \pm c$.

Then $\frac{a}{b} = \frac{b \pm c}{b} = 1 \pm \frac{c}{b}$.

If a number n be added to each term, we obtain the ratio $a + n : b + n$, but $\frac{a+n}{b+n} = \frac{b \pm c + n}{b+n} = 1 \pm \frac{c}{b+n}$.

But since the fractions $\frac{c}{b}$ and $\frac{c}{b+n}$ have the same numerator, the latter is the smaller fraction since it has the greater denominator, ∴ the amount by which $\frac{a+n}{b+n}$ differs from unity is less than that by which $\frac{a}{b}$ differs from unity. The use of the double sign ± enables us to prove the theorem for ratios of greater and of less inequality in one step.

If each term of $\frac{3}{5}$ be increased by 1, it becomes $\frac{4}{6}$, which is $\frac{2}{3}$, ∴ $\frac{2}{3}$ is nearer to unity than $\frac{3}{5}$, and since these are proper fractions, that is equivalent to saying that $\frac{2}{3}$ is greater than $\frac{3}{5}$.

If each term of $\frac{4}{7}$ be increased by 1, it becomes $\frac{5}{8}$. The fraction is increased, but it is then only equal to $\frac{10\frac{1}{2}}{12}$, which is less than $\frac{11}{12}$; *a fortiori*, $\frac{5}{8}$ is less than $\frac{11}{12}$.

If each term of $\frac{5}{9}$ be increased by 11, it becomes $\frac{6}{10}$, which is equal to $\frac{3}{5}$, ∴ $\frac{5}{9}$ is less than $\frac{3}{5}$.

Ans. $\frac{11}{12} < \frac{3}{5} < \frac{11}{12}$.

3. Simplify the expression—

$$\frac{a^2 - b^2 - c^2 + 2bc}{a - b - c} \times \frac{b^2 - c^2 - a^2 + 2ca}{b - c - a} \times \frac{c^2 - a^2 - b^2 + 2ab}{c - a - b}.$$

Arranging the numerators as the difference of squares, it becomes

$$\frac{a^2 - (b-c)^2}{a - b - c} \times \frac{b^2 - (c-a)^2}{b - c - a} \times \frac{c^2 - (a-b)^2}{c - a - b}$$
$$= \frac{(a - b + c)(a + b - c)}{a - b - c} \times \frac{(b - c + a)(b + c - a)}{b - c - a} \times \frac{(c - a + b)(c + a - b)}{c - a - b},$$

in which each denominator is minus the second factor of the numerator of the following fraction. The expression ∴ equals

$$\{-(a - b + c)\}\{-(b - c + a)\}\{-(c - a + b)\};$$

that is, $(b - a - c)(c - a - b)(a - b - c)$.

Geometry.

The following deductions were given last year:—

1. In the triangle ABC the angle B is double the angle A. If P be the foot of the perpendicular let fall from C upon AB, show that AP − PB = BC.

2. Describe a square equal to a given rectilineal figure. A square and a rectangle are equal in area: prove from the figure of the above proposition that the perimeter of the square is less than that of the rectangle.

3. If ABCD be a parallelogram, and P any point in the diagonal AC, prove that the triangle PBC is equal to PCD in area.

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(STAGES 2 AND 3.)

MINERALS OF THE IGNEOUS ROCKS.

(Continued.)

The Mica Group of alumino-silicates comprises the micas proper, and also chlorite, talc, and kaolin. The micas proper agree in very many of their physical properties, but in composition they vary considerably. The chief varieties are *muscovite* and *biotite*. Muscovite is typical of the alkali micas, and has the composition K_2O, $(H_2O)_2(Al_2O_3)_3(SiO_2)_6$; while biotite is typical of the magnesium-iron micas, and has the composition $(H_2, K_2)(Al_2, Fe_2)(Mg, Fe)_2Si_3O_{12}$. Probably all the micas are monoclinic. In hand specimens they usually appear as little plates with a remarkably good basal cleavage, and they can be split into flakes with a knife. In colour they vary from silvery white to bronze, green, and black.

Muscovite is always clear and generally colourless, but sometimes it is of a very faint yellow-brown colour. Idiomorphic crystals show hexagonal and rectangular sections, but the crystals are frequently allotriomorphic, and have frayed edges. The refractive index is near that of Canada balsam. Pleochroism is seldom exhibited. The polarisation colours are high, generally pink, green, and gray. No twinning is shown in thin sections.

Biotite, unlike muscovite, is generally coloured. In hand specimens the colour varies from dark green to bronze black, but biotite is occasionally colourless. In microscope slides the basal sections are usually dark brown, but are not markedly pleochroic. These sections show no cleavage. The vertical sections are paler, varying from yellow to brown, and these are very strongly pleochroic, the light from the polariser being almost completely absorbed when the shorter diagonal of the nicol is parallel to the basal cleavage. The single cleavage and the frayed edges help to distinguish it from hornblende. Black decomposition products are common.

Chlorites.—The chlorites are hydrated silicates of alumina, iron, and magnesia. They appear to be monoclinic. In hand specimens they look like dark-green micas, but are easily distinguished from them, as they are very soft, and can be scratched by the thumb nail. They split into flakes, but these are not so elastic as those of mica, and are easily broken. They often result from the alteration of biotite and other minerals.

In microscope sections they appear as hexagonal plates, or as very long hexagonal prisms arranged in fanlike aggregates, sometimes presenting a fibrous structure. The refractive index is higher than that of Canada balsam. Pleochroism is very marked, and if the colour is not too deep, polarised light shows bright colours.

Talc $(MgO)_3(SiO_2)_4H_2O$ is a white mineral very like muscovite, but is distinguished from it by its softness (hardness, only 1), and by being less lustrous. Under the microscope the sections appear as hexagons, but in cross section talc has a fibrous, streaky appearance.

Steatite is a massive form of talc.

Kaolin, Al_2O_3, $(SiO_2)_2$, $2H_2O$, results from the decomposition of the felspars, and occurs as very small colourless flakes, or as a white powder.

2. The ferro-magnesium silicates comprise the pyroxene and amphibole group and the olivine group. In some of the ferro-magnesium silicates, magnesium silicate is sometimes replaced by calcium silicate, and silicate of iron by silicates of chromium, manganese, nickel, and cobalt.

The Pyroxenes are usually dark green in colour. The chief of them are augite, diopside, the rhombic pyroxenes, bastite, and diallage.

Augite has approximately the chemical composition (Ca, Mg, Fe) SiO_3, but usually also contains a little Al_2O_3 and Fe_2O_3. In colour it varies from black to dark green and pale green. It occurs in short, thick prisms, and under the microscope it usually shows cleavage cracks nearly at right angles to each other. Microscopic sections often show a yellowish brown or a purplish colour. Some green varieties occur, and these are classed as soda-augites. The green varieties show distinct pleochroism, but this is not strongly marked in augite proper. The index of refraction is high, 1·72, so the surface appears pitted. Glass and small crystals of foreign substances occur as enclosures, and zoning is fairly common in the larger crystals. Simple twinning is common in porphyritic crystals. In polarised light rich, bright colours are shown.

Diopside, $MgSiO_3$, $CaSiO_3$, is a pale green to colourless monoclinic pyroxene containing little or no iron.

The Rhombic Pyroxenes have approximately the composition $(MgFe)SiO_3$, and crystallise in the rhombic system. They possess a metallic lustre and a high specific gravity. They are grouped according to the percentage of iron which they contain. When they contain less than 5 per cent. of FeO they are called *enstatite*, 5 per cent. to 15 per cent. *bronzite*, and over 15 per cent. *hypersthene*. Enstatite is pale, and is not appreciably pleochroic, whilst bronzite is bluish green to red brown, according to the position of the polarising nicol, and hypersthene is very strikingly pleochroic, varying from green to pink red. The crystalline form, although rhombic, is very similar to that of augite. The cleavage and refractive index are similar to those of augite, but the polarisation colours are not so bright, and for all vertical sections the extinction is straight.

Bastite is an altered rhombic pyroxene, and presents a fibrous or serpentinous structure. In microscopic sections it is pale brown to green, and shows pleochroism.

Diallage is a monoclinic pyroxene, and is practically an augite with a sub-metallic lustre, looking in hand specimens very like bronzite and bastite. In thin microscopic sections a fibrous structure is shown.

The Amphiboles vary from dark green and black through brown and light green to colourless. The most important amphiboles are hornblende, actinolite, and asbestos.

Hornblende has practically the same composition as augite, but crystallises in a different form. The two form a very good example of the dimorphism which is shown by the amphibole and pyroxene group. An amphibole melted and cooled slowly gives a pyroxene. At ordinary temperatures amphibole is the stable form, and at high temperatures pyroxene. In hand specimens hornblende is very like augite, but the prisms are longer, and are often arranged in radial bunches. In microscopic sections hornblende is generally found six-sided, like an elongated hexagon. Zoning is not so common as in augite, but cleavage is better marked by two series of well-defined lines intersecting at an angle of 124°. The refractive index, 1·65, is sufficiently high to show pitting, but is less than that of augite. Pleochroism is very marked, and is shown both by the vertical sections being generally darker than the cross sections, and by the change in colour as the polariser is rotated. Simple twins are occasionally met with, and are easily detected by the difference in colour in polarised light. Hornblende is usually too dark in colour, and absorbs too much light, to allow of the polarisation colours being very bright.

Actinolite is an amphibole containing no alumina. It usually occurs in long green prisms, arranged in radial bunches. In thin sections the colour is not usually deep enough to show marked pleochroism, otherwise it is very similar to hornblende.

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BY C. A. WEST, B.SC., A.R.C.S., F.I.C.

Detection of Chlorides, Bromides, Iodides, and Nitrates.—When any one of these classes of compounds is present singly it is easily detected, but when several or all of them occur together a special method of dealing with them must be employed. In order to understand the methods employed, we must remember the following facts:—

Solutions of chlorides, bromides, and iodides give precipitates with silver nitrate, which are not dissolved by nitric acid. The precipitates consist of silver chloride (white), silver bromide (cream or slightly yellow), and silver iodide (yellow). The reaction is similar in each case, and in the case of the chloride is represented by the equation

$$NaCl + AgNO_3 = AgCl + NaNO_3.$$

The silver chloride precipitate is very readily soluble in dilute ammonia, silver bromide dissolves only with difficulty in fairly strong ammonia, while silver iodide is practically insoluble in this reagent.

Chlorine liberates bromine and iodine from bromides and iodides thus

$$2NaI + Cl_2 = 2\,NaCl + I_2.$$

Both free iodine and bromine dissolve readily in carbon disulphide or chloroform, the iodine solution being reddish-violet, and the bromine solution reddish-brown.

Both bromine and iodine are capable of combining directly with chlorine, forming compounds which in dilute solution are practically colourless. (Two chlorides of iodine are known—namely, iodine monochloride, ICl, and iodine trichloride, ICl_3. A chloride of bromine also exists, and this probably has the formula BrCl. The formulæ of the compounds formed in the above reaction have not been definitely ascertained.)

Cupric sulphate gives with a soluble iodide a precipitate of cuprous iodide, an equivalent quantity of iodine being liberated at the same time,

$$2CuSO_4 + 4KI = Cu_2I_2 + 2K_2SO_4 + I_2.$$

If, however, a reducing agent, such as ferrous sulphate or sulphurous acid, is first added, the whole of the iodine is precipitated as cuprous iodide,

$$2CuSO_4 + 2KI + H_2SO_3 + H_2O = Cu_2I_2 + K_2SO_4 + 2H_2SO_4.$$

No precipitate under similar conditions is given by bromides or chlorides.

When a solution of an iodide or bromide is boiled with dilute sulphuric acid and a solution of potassium permanganate, the iodine or bromine is driven out according to the equation,

$$10KI + 2KMnO_4 + 8H_2SO_4 = 6K_2SO_4 + 2MnSO_4 + 8H_2O + 5I_2.$$

If chlorides are present, they are only affected to a comparatively slight extent, and nitric acid is not expelled by this treatment. Sulphuric acid liberates nitric acid from nitrates, and if the nitric acid is allowed to come into contact with a solution of ferrous sulphate in presence of sulphuric acid, it is reduced to nitric oxide, thus—

$$3H_2SO_4 + 6FeSO_4 + 2HNO_3 = 2NO + 3Fe_2(SO_4)_3 + 4H_2O.$$

The nitric oxide dissolves in the ferrous sulphate, possibly forming a compound of the formula $FeSO_4$, 2NO. This solution is dark-brown.

Oxidising agents, such as bromine, chlorine, cupric and ferric salts, and nitrous acid, liberate iodine from acid or neutral solutions of iodides. Starch solution is turned blue by free iodine, and this blue colour is supposed to be due to the formation of an iodide of starch, but the composition of the blue substance has not been investigated.

We will now suppose that we have a solution which *may* contain chlorides, bromides, iodides, and nitrates, and we wish to find which are present. We may proceed in the following way:—

1. Acidify a portion of the solution with nitric acid, and add a solution of silver nitrate. If a white precipitate forms, a chloride is present, and bromide and iodide are not present, unless in traces. If a deep yellow precipitate forms, an iodide is present. If the precipitate is yellow, wash it several times by decantation, add to it a dilute solution of ammonia (the ordinary bench solution diluted with five or six times its bulk of water will serve), shake up and filter. Acidify the filtrate with nitric acid. If a white precipitate forms, a chloride is present.

2. To a portion of the original solution add a little starch paste, and then chlorine water, drop by drop, shaking after the addition of each drop. If an iodide is present, the characteristic blue colour will appear. (Excess of chlorine by forming chloride of iodine may prevent the formation of the blue compound.)

3. If an iodide is present, then to a portion of the original solution acidified by dilute nitric acid add H_2SO_3 and $CuSO_4$, warm and filter off the precipitated Cu_2I_2. Expel the SO_2 by boiling, and divide the solution into two portions. To one add a little chloroform, or CS_2, and then NaOCl, or chlorine water, one drop at a time, shaking between the successive additions. If a bromide is present, the chloroform or CS_2 will be coloured reddish-brown. The presence or absence of chlorides may be confirmed by treating the second portion of the solution as described under 1 above.

4. To a portion of the original solution in a porcelain dish add dilute sulphuric acid, and boil. While boiling add a solution of $KMnO_4$, drop by drop, until a pink colour is produced, and persists for a few seconds. Boil for another minute or so, to ensure the expulsion of the last traces of bromine, and then cool the solution. To a small portion of this solution in a test tube add strong sulphuric acid slowly, keeping the solution cool. Now gently pour a solution of ferrous sulphate down the side of the tube, so that it floats as a layer on the top of the acid solution. If a nitrate is present, a brown film or layer will be formed where the two solutions meet. A second portion of this solution should be treated with nitric acid and silver nitrate, to test for chlorides. If any considerable quantity of chloride was present, some will be found here; but it must be remembered some of the chlorine is always expelled along with the iodine and bromine by the permanganate, so that if a trace is to be looked for, a negative result here must not be depended upon. The test described under 1 is the best for chlorides. Obviously it is not always necessary to apply all these tests. For instance, if a chloride is shown to be present by test 1, there is no need to test for it again; but it is sometimes convenient to apply test 4 before the others if a nitrate is suspected in presence of a bromide or iodide, and the solution can at the same time be examined for a chloride. The student can easily modify the method to be adopted in any particular case, provided he thoroughly understands what he is doing.

Cadmium in Zinc Ores.—To detect cadmium in a zinc ore, the following method is recommended by R. Biewend. Mix a little of the ore, 0·1 to 0·5 gram, with charcoal, potassium oxalate, spathic iron ore, or aluminium. Introduce into a narrow glass tube, and heat. A zinc deposit will form on the tube, and a little beyond it, if cadmium is present, a deposit of metallic cadmium or of cadmium oxide will form. If this is heated in air, it assumes the characteristic brown colour of the oxide; or if it is heated, and sulphur vapour passed over it, the characteristic sulphide appears.

Phosphates in Platinum Crucibles.—W. C. Heraeus has investigated the cause of the injury done to platinum crucibles during the analysis of phosphates. A certain amount of reduction of the phosphate occurs in the crucible. Carbon reduces magnesium pyrophosphate at 950° C., and reducing gases like hydrogen reduce it at temperatures below 900° C. Again, ammonia evolved during the ignition of ammonium magnesium phosphate behaves as a strong reducing agent, liberating a small amount of phosphorus, which attacks the crucible. No means of preventing this action has been found.

Boiling Point and Freezing Point of Pure Nitrogen.—Karl T. Fischer and Heinrich Alt have determined the following constants for nitrogen in the liquid form, and containing less than 0·3 per cent. of impurities: Boiling point 76·87° absolute under a pressure of 715 mm., and 77·37° under 760 mm. pressure; freezing point 62·52° absolute; and the melting pressure 86 ± 4 m.m. The temperatures were taken on a constant volume hydrogen thermometer, and the absolute zero taken to be $-273·04°$ C.

A Quick Method of Estimating Calcium.—The following method is a quick and reliable method of estimating calcium gravimetrically, and hence is a suitable method for examination purposes where the time is necessarily limited.

The calcium is first precipitated in the usual way as oxalate, washed and dried, and then transferred to a platinum crucible. Dry ammonium nitrate (a supply which has been dried at 100° and powdered should be kept in the laboratory), in the proportion of about three of the nitrate to two of calcium oxalate, is now mixed with the latter. The crucible is then heated (very cautiously at first) with an ordinary Bunsen flame for about ten to fifteen minutes. The whole of the calcium is converted into oxide, and ignition with the blowpipe is not necessary. In mixing the calcium oxalate and ammonium nitrate, care should be taken to do this thoroughly, so as to give the ammonium nitrate a fair opportunity of doing its work.

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THEORETICAL MECHANICS.

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BY FRANK CASTLE, M.I.M.E.,

Royal College of Science; Lecturer on Mechanics, etc., Morley College, London; Author of "Elementary Practical Physics," "Practical Mathematics," etc.

Measurement of Power.—In the preceding "Notes" a brief account of what is implied by the terms *force*, *work done by a force*, and *energy* has been given. It may be advisable at this stage to consider as briefly as possible the time-rate of a force. This is called *power*—that is, *power is the rate of doing work*. The unit of power receives various names according to the units of length and time adopted. The unit which is most convenient for the present purpose is one horse-power, or 33,000 foot pounds of work done per minute, usually written as 33,000 ft. lbs. Thus an engine of 20 horse-power is one assumed to be capable of developing work at the rate of $20 \times 33{,}000$ ft. lbs. per minute.

The word power should always strictly indicate rate of doing work. It is, however, noteworthy that the word is sometimes used to denote merely a force; but in such cases the data of a problem usually clearly indicates the meaning attached to the word, and no ambiguity can be the result.

It is advisable to devote as much time as possible to this section of the subject, more particularly to the solution of exercises dealing with power and its measurement. These may be obtained from any text-book on the subject. The following are a few typical problems:—

Ex. 1. A shaft, 560 feet deep and 5 feet in diameter, is full of water. How many foot pounds of work are required to empty it, and how long would it take an engine of 3½ horse-power to do the work? (Take $\pi = 3\frac{1}{7}$.)

Volume of water $= \pi \times (\frac{5}{2})^2 \times 560$ cubic feet.

Weight $= \pi \times (\frac{5}{2})^2 \times 560 \times 62{\cdot}3$ lbs.

Work done $= \pi \times (\frac{5}{2})^2 \times 560 \times 62{\cdot}3 \times {}^{56}\!/_{2}{}^{0} = 191400000$ ft. lbs.

Time required $= \dfrac{191400000}{3{\cdot}5 \times 33000} = 1661$ minutes.

In each of the preceding the answers obtained by four-figure logarithms are therefore only approximately correct.

Ex. 2. Prove that the horse-power of an engine which overcomes a resistance of R pounds at a speed of S miles an hour is

$$RS \div 375.$$

Calculate the horse-power required to drive a motor-car, weighing W tons, at S miles an hour,

(i) On the level,

(ii) Up an incline of one in m,

when the car is found to get up to the same speed in running freely down this incline. (Inter. Sc., 1904.)

1 H.P. = 33000 ft. lbs. of work per minute.

S miles per hour $= \dfrac{S \times 5280}{60} = 88S$ ft. lbs. per minute.

The work done by a resistance R lbs. at S miles per hour will be $R \times 88S$ ft. lbs. per minute. If H.P. denote the horse-power of the engine, then we obtain the relation

$$\text{H.P.} = \frac{88RS}{33000} = \frac{RS}{375}. \quad \ldots\ldots\ldots \quad (1)$$

(i) $R = 2240W$. Substituting this value in (1), we obtain

$$\text{H.P.} = \frac{2240WS}{375} = \frac{448WS}{75}.$$

(ii) As the car is found to get up to the same speed in running freely down the incline, it indicates that the component of W in the direction of the plane (or W sin θ, where θ is the inclination of the plane to the horizon) is such that it gives the numerical value of the resistance R, or $R = \dfrac{W}{m}$. Also in a distance S the weight W will be raised a vertical height $\dfrac{S}{m}$ feet.

$$\therefore \text{H.P.} = \frac{896WS}{m \times 375}.$$

Ex. 3. (i) Define work and horse-power, and prove that one horse-power is the equivalent of 375 mile pounds per hour.

(ii) Calculate the horse-power required to drive a motor-car, weighing one ton, up an incline of 1 in 14, at 24 miles an hour, supposing it to reach the same velocity when running freely down this incline. (Inter. Sc., 1902.)

(i) This is proved in Ex. 1.

(ii) Using the formula proved in Ex. 1, we have

$$\text{H.P.} = \frac{896WS}{75 \times m}.$$

Substituting the given values $W = 1$, $S = 24$, and $m = 14$, this becomes

$$\text{H.P.} = \frac{896 \times 24}{75 \times 14} = 20{\cdot}47.$$

Ex. 4. Ten horse-power is transmitted from one shaft to another by means of a belt moving over two pulleys with a linear velocity of 250 feet per minute; find the difference of tension on the two sides of the belt in pounds weight. (Inter. Sc., 1900.)

When the pulleys and the shaft are at rest, there must be an initial tension on the belt. This ensures that when in motion the force developed by the friction between the surfaces of the belt and the pulley is sufficient to transmit the motion from one shaft to the other, and to overcome the resistance of the driven shaft. Let T_2 denote the tension on the driving or tight side of the belt, and T_1 the initial tension or tension on the slack side; the driving force on the pulley will be $T_2 - T_1$. If V denotes the velocity of the belt in feet her minute, then the work done per minute, or power transmitted, is $(T_2 - T_1)V$.

If H.P. denotes the horse-power transmitted from one shaft to the other, it follows, as one horse-power is 33,000 ft. lbs. of work per minute, that the horse-power may be obtained from the relation

$$\text{H.P.} = \frac{(T_2 - T_1)V}{33000};$$

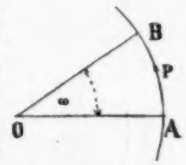
or the difference in the tensions on the two sides of the pulley is given by

$$T_2 - T_1 = \frac{33000 \times \text{H.P.}}{V}.$$

Substituting the given values, this becomes

$$T_2 - T_1 = \frac{33000 \times 10}{250} = 1320 \text{ lbs.}$$

Angular Motion.—If a force P moves through a distance AB, then the work done will be $P \times AB$. When the arc AB is a portion of a circle of which O is the centre, then joining the points B and A to O, if ω denote the angle AOB, the arc $AB = R\omega$, where R denotes the radius OA or OB.



For one revolution about O the angle described is 2π. Hence if N be the number of revolutions per minute, then the work done per minute will be $P \times 2\pi NR$, or, as it may be written, $PR \times 2\pi N$. The product PR, the moment of P about O, is usually referred to as the *turning moment* of P. This product is usually designated by T.

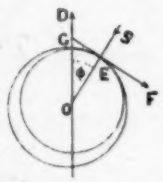
$\therefore$ work done per minute $= T \times 2\pi N$.

$$\text{Horse-power} = \frac{T \times 2\pi N}{33000}.$$

Horse-power lost in Frictional Resistances.—In many cases it is necessary to estimate the amount of work consumed or lost in the friction between the surfaces of sliding or rotating pieces. In the case of sliding or rolling, it is necessary to bear in mind, when motion takes place between two surfaces in contact, that the line of action of the resultant force or pressure between the surfaces is inclined at an angle ϕ to the common normal, where ϕ denotes the angle of friction.

We may consider a simple case such as an axle, the lower part assumed to be fixed and the upper part to rotate on it. The space between the two surfaces is much exaggerated for clearness.

When motion commences, the line SO of resultant pressure is inclined to the common normal OD at an angle ϕ (where $\tan\phi$ denotes the coefficient of friction).



If S denotes the resultant force, then the frictional force F is given by S cos EOG $= S \sin\phi$.

Let R denote the radius of the axle, then in one revolution the work absorbed in friction will be $2\pi RS \sin\phi$.

$\therefore$ work absorbed per minute $= 2\pi NRS\sin\phi$, . . (1)

where N denotes the number of turns per minute.

$$\text{H.P.} = \frac{2\pi RNS \sin\phi}{33000},$$

or if D is the diameter of the axle,

$$\therefore \text{H.P.} = \frac{\pi NDS \sin\phi}{33000}.$$

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Chesterman.—A curved quadrilateral figure is formed by the three parabolas

$$y^2 - 9ax + 81a^2 = 0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$
$$y^2 - 4ax + 16a^2 = 0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$
$$y^2 - ax + a^2 = 0, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

the other boundary being the axis of x. Find the area of the quadrilateral. (Honours, Inter. Arts, London, 1899.)

The parabolas (3) and (2) intersect in the point $x = 5a$, $y = 2a$, while (3) and (1) intersect in the point $x = 10a$, $y = 3a$.

Again, (1) intersects the axis of x, where $x = 9a$, and (2) intersects the axis of x, where $x = 4a$.

The area of the quadrilateral is therefore given by

$$\int_{5a}^{10a} \sqrt{ax - a^2} \, . \, dx + \int_{4a}^{5a} \sqrt{4ax - 16a^2} \, . \, dx - \int_{9a}^{10a} \sqrt{9ax - 81a^2} \, . \, dx.$$

$$\text{Now} \int_{5a}^{10a} \sqrt{ax - a^2} \, . \, dx = \sqrt{a} \int_{4a}^{9a} z^{\frac{1}{2}} dz,$$

if we take $z = x - a$.

$$\therefore \int_{4a}^{9a} \sqrt{ax - a^2} \, . \, dx = \tfrac{2}{3}\sqrt{a} \left[z^{\frac{3}{2}} \right]_{4a}^{9a}$$

$$= \tfrac{2}{3}\sqrt{a}\{(9a)^{\frac{3}{2}} - (4a)^{\frac{3}{2}}\} = \tfrac{38}{3}a^2.$$

$$\int_{4a}^{5a} \sqrt{4ax - 16a^2} \, . \, dx = 2\sqrt{a} \int_{0}^{a} z^{\frac{1}{2}} dz,$$

if we take $z = x - 4a$.

$$\therefore \int_{4a}^{5a} \sqrt{4ax - 16a^2} \, . \, dx = \tfrac{4}{3}\sqrt{a} \left[z^{\frac{3}{2}} \right]_{0}^{a} = \tfrac{4}{3}a^2.$$

$$\int_{9a}^{10a} \sqrt{9ax - 81a^2} \, . \, dx = 3\sqrt{a} \int_{0}^{a} z^{\frac{1}{2}} \, . \, dz,$$

if we take $z = x - 9a$.

$$\therefore \int_{9a}^{10a} \sqrt{9ax - 81a^2} \, . \, dx = 2\sqrt{a} \left[z^{\frac{3}{2}} \right]_{0}^{a} = 2a^2.$$

The area of the quadrilateral is therefore

$$\tfrac{38}{3}a^2 + \tfrac{4}{3}a^2 - 2a^2 = 12a^2.$$

Marguerite.—A dinner is provided for 15 persons at a fixed price per head, and the contractor reckons on a profit of 12½ per cent. Two persons are absent, and the remaining 13 pay the fixed price. The contractor loses 1s. 8d. What is the price of the dinner?

For every 100d. expended the contractor hopes to obtain 112½d. But since two of the 15 expected guests are absent, he will only obtain $\frac{13}{15}$ of 112½d., or 97½d., for every 100d. expended. The loss is therefore 2½d. for every 100d. expended. But the whole loss is 20d., and this is 8 times 2½d. Hence the total expenditure must have been 8 times 100d., or 800d. Now the contractor reckoned to obtain $\frac{112\frac{1}{2}}{100}$ times this, or $\frac{112\frac{1}{2}}{100} \times 800$d.—that is, 900d. The charge per head would therefore be 900d. ÷ 15—that is, 60d., or 5s.

Ralpho.—Construct a homogeneous symmetrical function of x and y of the second degree which shall vanish when $x = 2$, $y = 2$, and have a value 1 when $x = 4$, $y = 2$; and prove without actual expansion that

$$a(b - c)(b + c - a)^4 + b(c - a)(c + a - b)^4 + c(a - b)(a + b - c)^4 \equiv -16abc(a - b)(b - c)(c - a).$$

$ax^2 + bxy + ay^2$ is of the form required. Then by the question we shall have—

$$a \times 2^2 + b \, . \, 2 \times 2 + a \times 2^2 = 0.$$
$$\therefore 2a + b = 0. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

Again, from the question we shall have—

$$a \times 4^2 + b \times 4 \times 2 + a \times 2^2 = 1.$$
$$\therefore 20a + 8b = 1.$$

But from (1), $16a + 8b = 0$.

$$\therefore 4a = 1.$$

Hence $a = \frac{1}{4}$, and $b = -\frac{1}{2}$.

The required function is therefore $\frac{1}{4}x^2 - \frac{1}{2}xy + \frac{1}{4}y^2$.

Since the expression

$$a(b - c)(b + c - a)^4 + b(c - a)(c + a - b)^4 + c(a - b)(a + b - c)^4$$

becomes zero when $a = 0$, therefore a is a factor of this expression. Similarly we may show that b and c are each of them factors of this expression.

Again, if $a - b = 0$, the expression becomes

$$b(b - c)(c)^4 + b(c - b)(c)^4 + c(0)(2b - c);$$

that is, $b(b - c)c^4 - b(b - c)c^4 + 0$, or zero.

Hence $(a - b)$ is a factor of the expression.

Similarly, $(b - c)$ and $(c - a)$ are factors of the given expression. Therefore

$$a(b - c)(b + c - a)^4 + b(c - a)(c + a - b)^4 + c(a - b)(a + b - c)^4 \equiv \mathrm{L}\, abc(a - b)(b - c)(c - a),$$

where L is only a numerical quantity, since both sides of the identity are of six dimensions. Further, being an identity, this relation will hold for all values of a, b, and c. Therefore to determine L put $a = 1$, $b = -1$, and $c = 2$.

$$\therefore 1(-3)(0)^4 + (-1)(1)(4)^4 + 2(2)(-2)^4 = \mathrm{L}\,(1)(-1)(2)(2)(-3)(1).$$
$$\therefore 0 - 4^4 + 4 \times 2^4 = 12\mathrm{L}.$$
$$\therefore \mathrm{L} = \frac{-256 + 64}{12} = -16.$$

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Ibbat.—Prove that the portion of the normal at P of a rectangular hyperbola intercepted by the axes is bisected at P. If a straight line moves so that the difference of the squares of its intercepts on the co-ordinate axes is constant, prove that it is constantly normal to a fixed rectangular hyperbola.

(B.A., London, 1903.)

Let $x^2 - y^2 = c^2$ be any rectangular hyperbola, and let x', y' be the co-ordinates of any point P on the curve. Then the tangent at P is $x'x - y'y = c^2$.

Hence the normal at P is

$$y = -\frac{y'}{x'} \cdot x + n,$$

where n is a constant.

Since the normal passes through the point (x', y'), we must have—

$$y' = -\frac{y'}{x'} \cdot x' + n. \quad \therefore n = 2y'.$$

The equation of the normal at P is therefore

$$y + \frac{y'}{x'} \cdot x = 2y',$$

and this may be written in the form

$$\frac{x}{2x'} + \frac{y}{2y'} = 1.$$

Therefore (x', y') is the middle point of the portion of the normal at P intercepted by the axes.

Let $\frac{x}{X} + \frac{y}{Y} = 1$ be a straight line which moves so that the difference of the squares of its intercepts on the co-ordinate axes is constant.

Then $X^2 - Y^2 = k^2$, where k^2 is a constant. Hence

$$\left(\frac{X}{2}\right)^2 - \left(\frac{Y}{2}\right)^2 = \frac{k^2}{4}.$$

But $\frac{X}{2}, \frac{Y}{2}$ are the co-ordinates of the middle point of the portion of the line $\frac{x}{X} + \frac{y}{Y} = 1$ which is intercepted by the axes, and the last equation shows that this point lies upon the fixed rectangular hyperbola $x^2 - y^2 = \frac{k^2}{4}$.

Hence, by the foregoing proof, the line

$$\frac{x}{X} + \frac{y}{Y} = 1$$

is constantly normal to a fixed rectangular hyperbola, provided that $X^2 - Y^2$ is constant.

H.H.—Prove that an elastic stick, let fall vertically from a height of h feet on a hard pavement, and rebounding each time vertically with e times the striking velocity, will have described

$$\frac{1 + e^2}{1 - e^2} h \text{ feet in } \frac{1 + e}{1 - e}\sqrt{\frac{2h}{g}} \text{ seconds}$$

before the rebounds cease.

From the relation $v^2 = 2gh$, the velocity of the stick at the instant of striking is given by $v = \sqrt{2gh}$, also as $h = \frac{1}{2}gt^2$, the time of falling is obtained from $t = \sqrt{\frac{2h}{g}}$.

The kinetic energy of the stick at the instant of striking is $\frac{1}{2}mv^2$, where m denotes the mass of the stick. As the stick rebounds vertically with e times the striking velocity, we obtain $h^1 = e^2h$, where h^1 is the height to which it rises on its first rebound. In a similar manner e^4h would be the height to which it would rise on its second rebound, e^6h the height on its third rebound, etc. The space described in the first rebound during the up and down motion will be $2e^2h$, in the second rebound $2e^4h$, etc.

Hence the stick will describe a total distance or space given by the expression

$$S = h + 2(e^2h + e^4h + e^6h + \ldots) \text{ feet,}$$

in a time $\sqrt{\frac{2h}{g}} + 2\left(e\sqrt{\frac{2h}{g}} + e^2\sqrt{\frac{2h}{g}} + \ldots\right)$ seconds.

It will be seen that these form two geometrical series.

$\therefore (1 + e^2 + e^4 + e^6 + \ldots)\, h + e^2h(1 + e^2 + e^4 + e^6 + \ldots).$

The sum of a geometrical progression to infinity is given by $\frac{a}{1 - r}$, where a denotes the first term and r the common ratio.

Thus we obtain $\frac{1 + e^2}{1 - e^2} h$ as the distance described in feet.

The time taken is $\frac{1 + e}{1 - e}\sqrt{\frac{2h}{g}}$ seconds.

Xerxes.—What reactions of aluminium salts make it possible to detect them in presence of iron and chromium salts? Which of these reactions would be available for the separation of aluminium, iron, and chromium?

1. Most aluminium salts heated on charcoal yield the oxide, and this glows brightly in the blowpipe flame. Iron and chromium oxides do not glow in this way.

2. Caustic potash (KOH) or caustic soda (NaOH) solution precipitates iron, chromium, and aluminium as hydrates from solution, but the aluminium hydrate dissolves in excess. The diluted and filtered solution acidified with HCl, and then made alkaline with ammonia again, gives a precipitate of aluminium hydrate.

The equations representing these reactions are—

$$AlCl_3 + 3NaOH = Al(OH)_3 + 3NaCl.$$
$$FeCl_3 + 3NaOH = Fe(OH)_3 + 3NaCl.$$
$$CrCl_3 + 3NaOH = Cr(OH)_3 + 3NaCl.$$

The aluminium hydrate, when it dissolves in excess of soda, forms sodium aluminate thus—

$$Al(OH)_3 + 3NaOH = Al(ONa)_3 + 3H_2O.$$

This, on treatment with hydrochloric acid, gives aluminium chloride thus—

$$Al(ONa)_3 + 6HCl = AlCl_3 + 3NaCl + 3H_2O.$$

The aluminium chloride, when treated with AmOH, gives a precipitate of aluminium hydrate.

3. Hydrogen disodium phosphate (HNa_2PO_4) added to a solution containing iron, chromium, and aluminium salts, precipitates phosphates of the three metals. The aluminium phosphate alone is soluble in caustic soda, and this enables it to be separated in the same way as the aluminium hydrate.

The reactions under 2 or 3 can be used for separating aluminium from iron and chromium. Making use of those under 2, the actual method of separation would be as follows:—To the solution containing iron, chromium, and aluminium salts add a few drops of nitric acid, and boil to ensure all the iron being in the ferric state. Add caustic soda in excess and boil. Dilute and filter. (*Note.*—If the caustic soda is concentrated, it will attack the filter paper.) To the filtrate add HCl until acid, and then AmOH until alkaline, and warm. A white precipitate shows the presence of aluminium, which has thus been separated from the iron and chromium.

The chromium and iron in the precipitate insoluble in caustic soda may, if desired, be separated as follows:—Wash the precipitate, dry and fuse it on platinum foil with fusion mixture and a little KNO_3. Boil in water and filter. The filtrate will contain the chromium as chromate. This may be confirmed by adding acetic acid and lead acetate. The residue, insoluble in water, is brownish-red ferric oxide.

Arbela.—Prove that if three circles cut one another two and two, the common chords of each pair cut one another at one point. (Taylor's Pitt Press *Euclid.*)

(*Lemma.* To find the condition that three lines respectively perpendicular to the three sides of a given triangle ABC shall cut one another at one point. Let perpendiculars from any two points X, Y in BC, CA respectively intersect in P. Draw PZ perpendicular to AB, and join PA, PB, PC.

Then $PA^2 - PB^2 = PZ^2 + AZ^2 - PZ^2 - BZ^2$.

$\therefore AZ^2 - BZ^2 = PA^2 - PB^2$.

Similarly, $BX^2 - CX^2 = PB^2 - PC^2$,

and $CY^2 - YA^2 = PC^2 - PA^2$.

$\therefore AZ^2 - ZB^2 + BX^2 - XC^2 + CY^2 - YA^2 = 0$.

And this is the required condition that the three perpendiculars shall intersect in one point.)

Let A, B, C be the centres of three circles which intersect in pairs. Then the common chord of the first pair will cut AB at right angles in the point Z, such that $AZ^2 - ZB^2 = R_a^2 - R_b^2$, where R_a is the radius of the circle whose centre is at A, and R_b the radius of the circle whose centre is at B. Similarly, if R_c be the radius of the circle whose centre is at C, we have $BX^2 - CX^2 = R_b^2 - R_c^2$, and $CY^2 - YA^2 = R_c^2 - R_a^2$ (Y and X being the points in which the common chords intersect BC and CA).

$\therefore AZ^2 - ZB^2 + BX^2 - XC^2 + CY^2 - YA^2 = 0$.

Hence by the lemma the common chords intersect at one point.

(Another proof will be found in the Solutions to Taylor's *Euclid.*)

Vivian.—Consult any elementary work on magnetism. For example, see *Elementary Lessons in Electricity and Magnetism*, by S. P. Thompson, § 152.

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MEIKLEJOHN AND HOLDEN.

The Practical Arithmetic. Books I.-IV. By Arthur H. Baker, B.A. These books are prepared for schools where Scheme A is still in vogue. They are each well supplied with examples in exercise and problem forms, and are well arranged as regards progression. The problems are an exceedingly useful set, and the answers are correct.

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Geometry on Modern Lines. Boulton. There is much to be said in favour of a shortened course in geometry, but when one finds the treatment of the first six books contracted to one hundred pages, and these including a considerable number of exercises, one becomes suspicious. Only necessary propositions, we are told, have been retained, and the proofs are based upon the simplest process of reasoning possible; but there will be various opinions as to the meaning of necessary in this connection. What there is, is good; and the publishers have done their work well.

SIR ISAAC PITMAN AND SONS.

Scheme B Arithmetic. Standard VI. By T. W. Trought, B.A. A complete course of work on a well-arranged plan.

The Story of Our Own Times. (King Edward History Readers.) The abundance, attractiveness, and usefulness of the illustrations in this reading book should go far to recommend it. In a volume of two hundred pages there are some one hundred and thirty pictures, including six excellent coloured plates, as well as a dozen maps. These have been selected with such manifest care that after a critical examination of the whole set it would be difficult to mention one which might be deleted without lessening the value of the book. The subject-matter deals with the history of the British Empire from the accession of Queen Victoria to the unfolding of the "proposals for retaliatory and preferential tariffs." The book is crammed with information, but the language is everywhere simple and engaging. The more strictly political topics have been handled with a becoming degree of delicacy. The choice of subjects has evidently occasioned much thought, and the marked variety in the sequence of chapters forms not the least pleasing feature. Thus we get a helpful lesson on "Cheap Bread," followed by "The Crystal Palace," "The Gold Fever," and "The Iron Duke." The book should do capital service as a reader for continuation schools, or for the upper standards.

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Helps to the Study of Bacon's Essays. By T. Margerison, M.A. The author has collected a few of the most typical essays and annotated them for school use. The introduction contains a good account of the life and writings of Bacon, a very good critical appreciation of his style, diction, and grammar, and of his place in English literature. Appended are some notes on paraphrase, an exercise to which the essays are peculiarly suitable, and several passages are paraphrased. We recommend the book to teachers; a few well-chosen essays are better for the purpose of class teaching than the whole collection. The questions are models of what good questions should be.

RELFE BROTHERS, LIMITED.

How to Read French. By H. Blouet, B.A. The title of the book affords little clue to its plan and to its contents. We were prepared to find from the title that the book would contain some directions to enable the student to obtain the greatest possible profit from his reading of a French author, but did not find this to be the case. The book only justifies its title in so far as it gives some directions for pronunciation of French. The editor wisely restricts his explanations to those sounds which have analogies in the pronunciation of English; and for those which have no representative in spoken English, he refers the pupil to the assistance of a teacher. For the rest, the book contains a collection of short stories, mainly of a humorous character, and a vocabulary. Most of the stories are very old friends, and appear, at any rate so far as the majority of them are concerned, to have been turned into French for the purposes of this book. The style of the French might, in many cases, be improved, and serious errors occur in such numbers as to detract from the usefulness of the book. Examples of these are "*qui* maman a fait bouillir;" "lui demanda ce qu'il voulait qu'il *fasse*;" "on la lui *remis*;" "je m'étonne que vous n'*ayiez* pas renoncé à cette profession dangereuse;" "*un* exécution." In addition to these positive errors, and to the somewhat slipshod character of the French in places, one finds such things as the following: "Un jour il alla voir le père *d'un de ses élèves* et rencontra chez lui un matelot qui revenait *d'un de ses voyages* et qui avait entrepris d'apporter un perroquet envoyé au maitre de la maison par *un de ses amis*." It should have been possible also to have avoided combinations which offend both eye and ear, such as, "La vente commencera *à à peu près*....." "il y *a à peu près* deux ans." The book needs a careful revision before it can, with profit, be put into the hands of the young students for whom it is intended.

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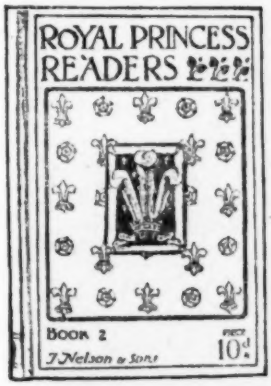

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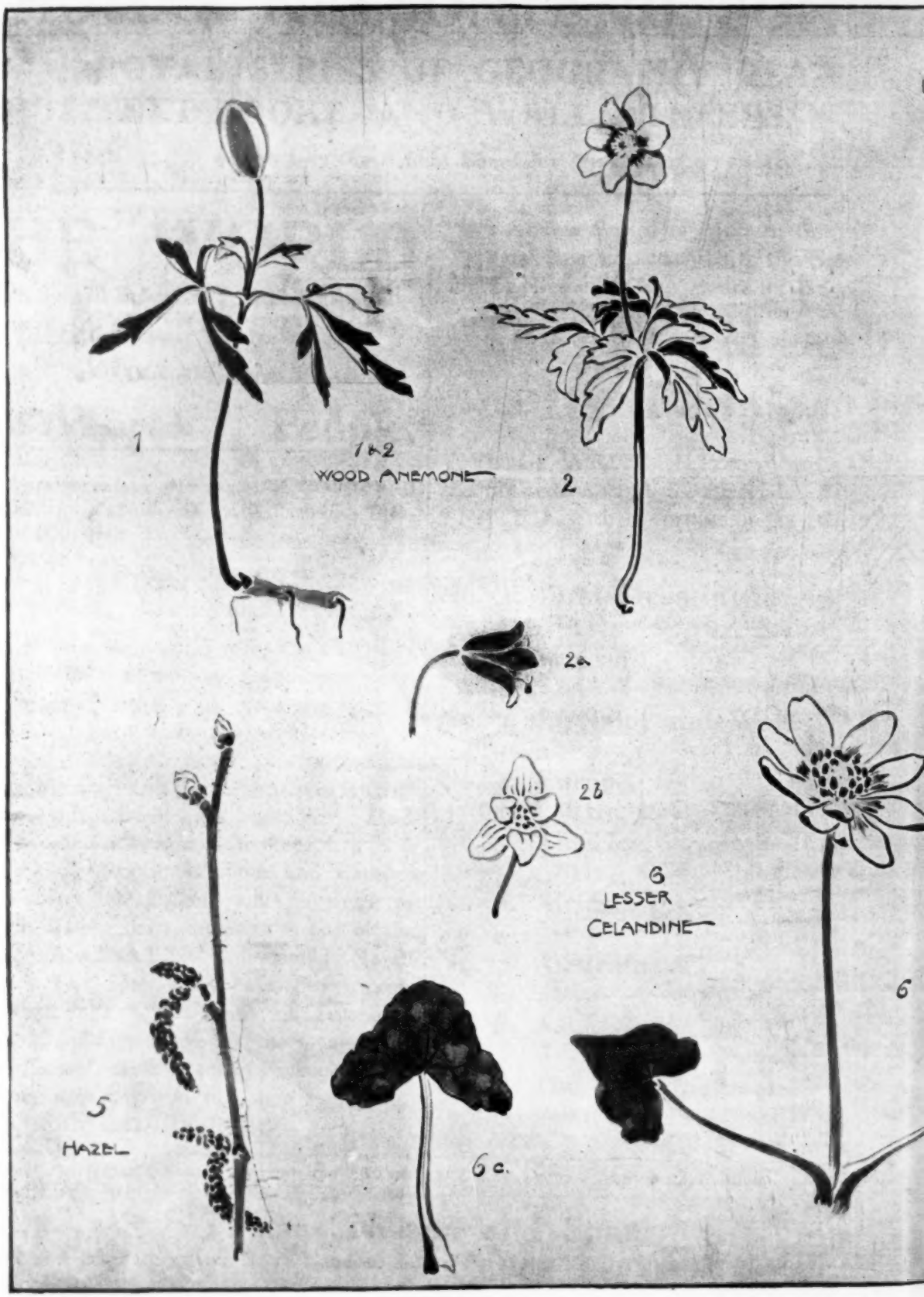

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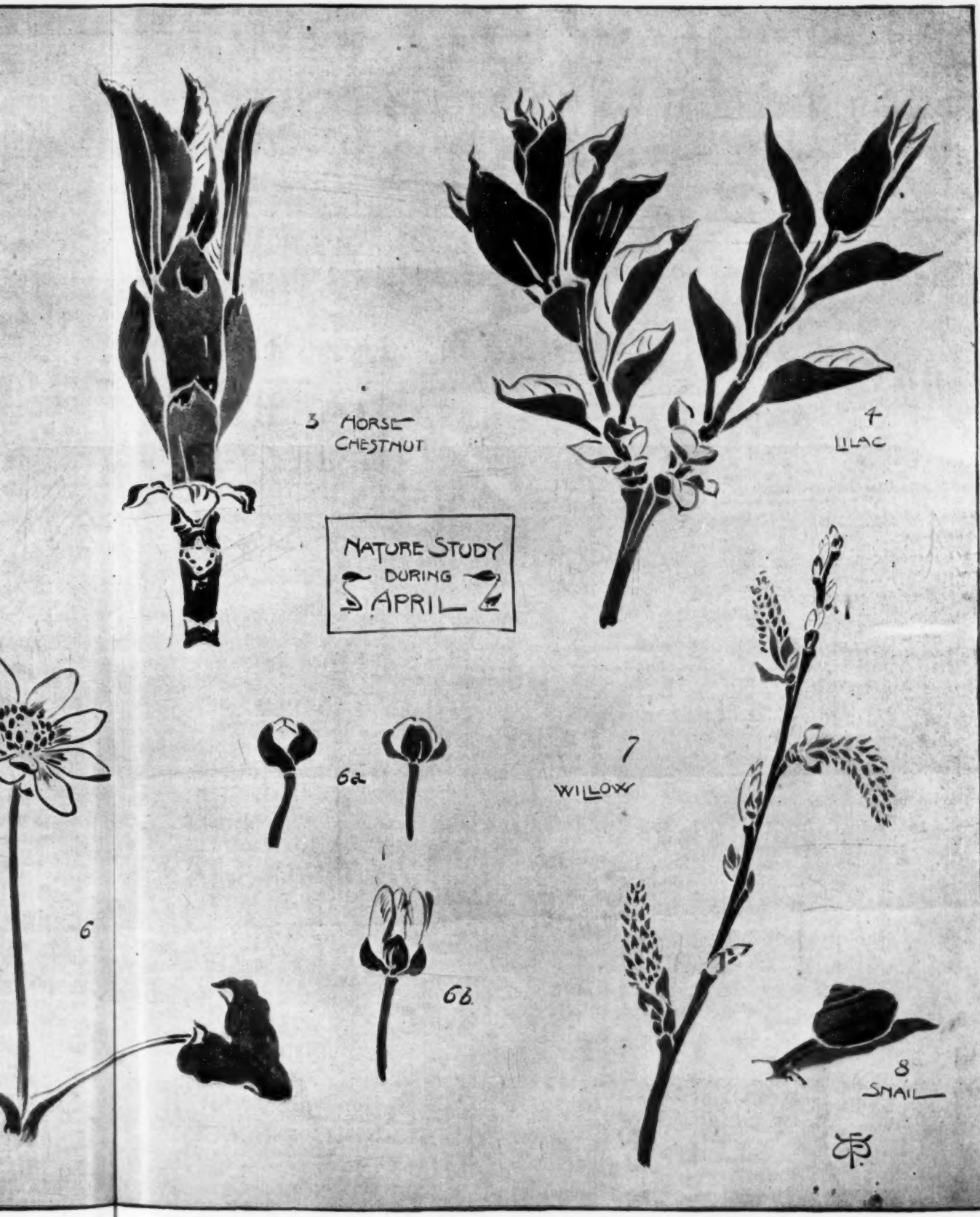

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